APPENDIX A

METES AND BOUNDS SURVEY

LOCKWOOD, KESSLER & BARTLETT, INC.

CONSULTING ENGINEERS SINCE 1889 1 AERIAL WAY, SYOSSET, NEW YORK 11791 TEL. (516) 938-0600

DRAWING TITLE

ALTA/ACSM LAND TITLE SURVEY
OLD HEINZ PROPERTY
BOROUGH OF QUEENS
CITY OF NEW YORK STATE OF NEW YORK

DESIGN BY:	PROJECT NO.: 5320-00
DRAWN BY: NG	
CHECKED BY: NG	DRAWING NO.
DATE: JUNE 5,1996	
SCALE: 1" = 50'	

REV.	DATE	REMARKS	BY
4	3/3/97	SURVEY UPDATE PERFORMED, CERTIFICATIONS REVISED	NG
3	2/3/97	ADDED PROPERTY CALLS, NEW DESCRIPTIONS, CERTIFICATIONS	NG
2	1/24/97	METROPOLITAN AVE. SEWER LINE DIMENSIONED	NG
1	1/8/97	PROPOSED SUBDIVISION ADDED, FIRE MAINTENANCE EASE. DELETED	NG

LEGEND:

PROPERTY LINE
DEED LINE
ADJACENT PL
FINAL SECTION LINE
EASEMENT
WATER
TREE
TREELINE
BRUSH
FENCE
GUARD RAIL
CURB
EDGE OF ROAD
POWER POLE — PP
LIGHT POLE — LP
HYDRANT — HYD
DROP INLET — DI
CATCH BASIN — CB
MANHOLE — MH

To FC Metropolitan Associates, L.P.; FC Sybil'lo Associates, LP; Commonwealth Land Title Insurance Company; New York Land Services, Inc.; Regal Cinemas, Inc.; European American Bank; and their respective successors and assigns:

This is to certify that this map or plat and the survey on which it is based were made (i) in accordance with "Minimum Standard Detail Requirements for ALTA/ACSM Land Title Surveys," jointly established and adopted by ALTA and ACSM in 1992, and includes items 4,8,10,11a,11b of Table A thereof, and (ii) pursuant to the Accuracy Standards (as adopted by ALTA and ACSM and in effect on the date of this certification) of an "Urban" Survey.

Date: 3/4/97

Sylvester A. Celebrini

SYLVESTER A. CELEBRINI N.Y.L.S. # 049496

STATE OF NEW YORK — SYLVESTER A. CELEBRINI — No. 049496 — LICENSED LAND SURVEYOR

Block 3386 Lots 800 and 830:

COMMENCING at the intersection of the southerly line of Metropolitan Avenue as presently acquired with the easterly line of Trotting Course Lane; thence easterly along said line of Metropolitan Avenue a distance of 226.36 feet to the easterly line of lands formerly of the Long Island Rail Road Company, Rockaway Beach Division, being the POINT OF BEGINNING; thence continuing along said line of Metropolitan Avenue the following two (2) courses and distances:
1) N 72° 06' 27" E, a distance of 29.54 feet (Deed, 29.63 feet) to a point; thence
2) N 71° 59' 08" E, a distance of 160.41 feet (Deed, 160.39) to the westerly line of lands now or formerly of Metfor Building Corp.; thence along said westerly line of Metfor Building Corp. parallel to 69th Avenue S 17° 12' 03" E, a distance of 243.05 feet (Deed, 243.34 feet) to the westerly line of lands formerly of the Long Island Rail Road Company, Montauk Division; thence along said westerly line of lands formerly of the Long Island Rail Road Company, Montauk Division the following six (six) courses and distances:
1) S 42° 18' 00" W, a distance of 16.00 feet to a point; thence
2) S 42° 41' 11" E, a distance of 152.74 feet (Deed, 152.66 feet) to a cusp of a curve; thence
3) southeasterly along the arc of said curve bearing to the left having a radius of 360.00 feet and an arc length of 155.54 feet to the point of tangency of said curve; thence
4) S 67° 48' 19" E, a distance of 434.18 feet to a point; thence
5) S 73° 28' 19" E, a distance of 313.27 feet to a point; thence
6) S 76° 26' 40" E, a distance of 257.15 feet (Deed, 259.75 feet) to a cusp of a curve on the northerly line of other lands formerly of the Long Island Rail Road Company, Montauk Division; thence along said northerly line of lands formerly of the Long Island Rail Road Company, Montauk Division the following two (2) courses and distances:
1) southwesterly along the arc of a curve bearing to the left having a radius of 1,960.08 feet and an arc length of 670.98 feet (Deed, 671.28 feet) to the point of tangency of said curve; thence
2) S 54° 39' 52" W, a distance of 54.69 feet to the easterly line of lands formerly of the Long Island Rail Road Company, Rockaway Beach Division; thence along said easterly line of lands formerly of the Long Island Rail Road Company, Rockaway Beach Division the following four (4) courses and distances:
1) N 37° 49' 30" W, a distance of 565.85 feet to a point; thence
2) N 36° 50' 34" W, a distance of 111.25 feet (Deed, 113.60 feet) to the former southerly line of Trotting Course Lane; thence
3) N 37° 36' 21" W, a distance of 174.70 feet (Deed, 169.28 feet) to the former northerly line of Trotting Course Lane; thence
4) N 36° 49' 29" W, a distance of 429.23 feet (Deed, 430.91 feet) to the point or place of beginning.
containing 339,175 square feet or 7.786 acres more or less.

DRIVEWAY AND RIGHT OF ACCESS EASEMENT 'FIRST TRACT':

BEGINNING at the intersection of the westerly line of 69th Avenue (60 feet wide, open and in use) with the southerly line of Sybilla Street (60 feet wide, open and in use); thence along said line of Sybilla Street S 66° 17' 10" E, a distance of 79.37 feet to its intersection with the easterly line of 69th Avenue extended southerly; thence passing through lands formerly of the Long Island Rail Road Company, Montauk Division along said easterly line of 69th Avenue extended southerly S 17° 12' 03" E, a distance of 39.08 feet to the southerly line of lands formerly of the Long Island Rail Road Company, Montauk Division; thence along said southerly line of lands formerly of the Long Island Rail Road Company, Montauk Division N 67° 48' 19" W, a distance of 77.61 feet to its intersection with the aforementioned westerly line of 69th Avenue extended southerly; thence along said westerly line of 69th Avenue extended southerly N 17° 12' 03" W, a distance of 41.81 feet to the point or place of beginning.

DRIVEWAY AND RIGHT OF ACCESS EASEMENT 'SECOND TRACT'

Fronting on the southerly line of Ursula Place (45 feet wide, partially open, not in use), opposite 70th Road (60 feet wide, open, partially in use) and beginning at a point common to the westerly line of lands formerly of the Long Island Rail Road Company, Montauk Division and a distance of 50 feet measured northerly and radially from the line established as the monumented centerline of railroad of said Long Island Rail Road Company, Montauk Division; thence along said westerly line of lands formerly of the Long Island Rail Road Company, Montauk Division N 76° 26' 40" W, a distance of 78.22 feet (Deed, 75.69 feet) to a point; thence easterly through said lands formerly of the Long Island Rail Road Company, Montauk Division N 72° 47' 57" E, a distance of 67.48 feet (Deed, 71.13 feet) to the aforementioned southerly line of Ursula Place; thence easterly along said southerly line of Ursula Place along the arc of a curve bearing to the left having a radius of 1,089.74 feet an arc length of 121.80 feet (Deed, 123.82 feet) to a point; thence passing through said lands formerly of the Long Island Rail Road Company, Montauk Division S 72° 47' 57" W, a distance of 115.24 feet (Deed, 124.04 feet) to the point or place of beginning.

MAP REFERENCES:
1) BOROUGH OF QUEENS TOPOGRAPHICAL BUREAU FINAL SECTION MAP NO.45 AND ALTERATION MAPS AFFECTING THE PROPERTY.
2) 'STATION MAP - TRACKS & STRUCTURES' V1-17,V1-18,V1-L17, V10-179 DATED 1916 AND REVISED SUBSEQUENTLY PROVIDED BY THE MTA.

NOTES:
1) THE BEARINGS SHWON HEREON REFER TO THE BOROUGH OF QUEENS TOPOGRAPHICAL BUREAU COORDINATE SYSTEM.
2) FIELD SURVEY PERFORMED IN AUGUST 1995, LOT 830 IN FEBRUARY 1996.
3) TAX MAP LOT NUMBERS SHOWN HEREON ARE BASED UPON TAX MAPS DATED JUNE 1996.
4) THERE ARE NO STREAMS OR NATURAL WATERCOURSES ON THE PROPERTY. THE PROPERTY DOES NOT LIE WITHIN A FLOOD ZONE AS SHOWN ON NFIP MAP #360497 0058 B.

0 50 100 150 200 250 FT
SCALE

70TH (60' ROW) ROAD (VIOLA PL.)
STREET CLOSED BY CITY OF NEW YORK 4-11-57
URSULA (45' ROW) PLACE
70TH (60' ROW) (URSULA PL.) AVENUE
69TH (60' ROW) (THERESA PL.) ROAD
69TH (60' ROW) (SYBILLA ST.) AVENUE
SYBILLA (60' ROW) STREET
METROPOLITAN AVENUE
TROTTING COURSE LANE (IRR. WIDTH)
73RD AVE. (KATE PLACE) (60' ROW)
DRIVEWAY AND RIGHT OF ACCESS EASEMENT GRANT IN FAVOR OF TAX LOT 800 D.5296 P.166 'FIRST TRACT'
DRIVEWAY AND RIGHT OF ACCESS EASEMENT GRANT IN FAVOR OF TAX LOT 800 D.5296 P.162 'SECOND TRACT'
LEASE IN FAVOR OF THE CENTRAL FOUNDRY CO. 12-16-75
LEASE IN FAVOR OF RENTAR REALTY CORP. 10-8-59
ABANDONED BED OF TROTTING COURSE LANE (CLOSED AS PER LIBER 5197 PAGE 378)
EASEMENT PARCEL D-E IN FAVOR OF THE CITY OF NEW YORK D.6534 P.29
PROPOSED SUBDIVISION & TENTATIVE TAX LOT LINE
TENTATIVE TAX LOT 800 AREA=11,482± SQ.FT. OR 0.264 ACRES
TENTATIVE TAX LOT 835 AREA=327,694± SQ.FT. OR 7.523 ACRES
BLOCK 3886
LOT 340 N/F THE CITY OF NEW YORK D.6534 P.29 (FORMERLY LONG ISLAND RAIL ROAD COMPANY, MONTAUK DIVISION)
LOT 800 N/F LEONA CHUTICK AND SIDNEY C. WINTON, AS TRUSTEES (13.0536%); LEONA CHUTICK AND SIDNEY C. WINTON, AS TRUSTEES (13.0536%); LILLIAN CHUTICK AND REBECCA CHUTICK, AS TRUSTEES (69.262%); SHIRLEY CHUTICK, ANDREA LYNN CHUTICK AND MAXINE E. ROSEMAN, AS TRUSTEES (24.631%) R.1370 P.28, R.1699 P.1310, R.3415 P.1893, R.3415 P.1888 AREA=317,374± SQ.FT. OR 7.286 ACRES
LOT 837 N/F METFOR BUILDING CORP. R.522 P.894
LOT 830 N/F JOHNNY COESTER R.1448 P.1039 AREA=21,802± SQ.FT. OR 0.501 ACRES
LOT 558
LOT 550
LOT 845
LOT 700 N/F ROBERT EDELSTEIN R.2209 P.457
LOT 671 N/F NEW YORK CITY INDUSTRIAL DEVELOPMENT AGENCY R.1773 P.1205
LOT 650 N/F LONG ISLAND FIRE PROOF DOOR, INC. R.2280 P.276
LOT 74 N/F MORGAN GUARANTY TRUST COMPANY OF NEW YORK R.1525 P.255
LOT 695 N/F THE CITY OF NEW YORK L.6682 P.106
LOT 750 N/F THE CITY OF NEW YORK D.6534 P.29 PARCEL C
LOT 449 N/F THE CITY OF NEW YORK D.6534 P.29 PARCEL D
LOT 450 N/F THE CITY OF NEW YORK D.6534 P.29 (FORMERLY LONG ISLAND RAIL ROAD COMPANY, MONTAUK DIVISION)
LOT 480 N/F THE CITY OF NEW YORK DATE: 8-9-60
LOT 380
LOT 38
POINT OF COMMENCEMENT (ALL LOTS)
P.O.B. LOT 830
P.O.B. LOT 800

APPENDIX B

BOUNDARY MAP

SURVEY No. 54232-1
SHEET 1 OF 2

SURVEY No. 54232-1
SHEET 2 OF 2

70TH ROAD
(VIOLA PLACE)

ONE STORY CONCRETE BLOCK BUILDING

URSULA PLACE
(NOT IN USE AS A STREET)

70TH AVENUE
(VIOLA PLACE)
(NOT IN USE AS A STREET)

1 STORY BRICK BUILDING

LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY

PROJECTED CENTERLINE OF RAILROAD

LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY'S MONTAUK DIVISION

69TH AVENUE
(VIOLA PLACE)

69TH AVENUE
(VIOLA PLACE)

URSULA STREET

POSSIBLE DETERMINATION OF THE LONG ISLAND RAILROAD BOUNDARY AS COMPILED FROM FILED MAPS, DEEDED MAPS AND OLD SURVEYS. OTHER DETERMINATIONS ARE POSSIBLE AND THIS SURVEYOR DOES NOT CERTIFY THIS DETERMINATION AS FINAL LOCATION OF THE BOUNDARY.

SELFRIDGE ST.

METROPOLITAN AVENUE

LAND NOW OR FORMERLY OF METHOR BUILDING CORP.
THREE STORY BRICK BUILDING

LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY

TAX LOT 600

TAX BLOCK 3886

TAX LOT 600
PARCEL AREA= 359,159 SQ.FT.
OR 8.24316 ACRES

FORMER TROTTING COURSE LANE

LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY
GLENDALE CUTOFF

LAND NOW OR FORMERLY OF THE LONG ISLAND RAILROAD COMPANY
GLENDALE CUTOFF

TROTTING COURSE LANE

73rd AVENUE

POSSIBLE DETERMINATION OF THE LONG ISLAND RAILROAD BOUNDARY AS COMPILED FROM FILED MAPS, DEEDED MAPS AND OLD SURVEYS. OTHER DETERMINATIONS ARE POSSIBLE AND THIS SURVEYOR DOES NOT CERTIFY THIS DETERMINATION AS FINAL LOCATION OF THE BOUNDARY.

LEGEND

GENERAL NOTES

UTILITY COVERS

SURVEY OF THE
PS650-Q,CSD24
PS650-Q,CSD28

NEW HS 1000-Q

METROPOLITAN AVENUE, 69th AVENUE, SYBILLA ST, URSULA PLACE, 70th ROAD

BOROUGH OF QUEENS

MADE FOR THE
SCHOOL CONSTRUCTION AUTHORITY
CITY OF NEW YORK

APPENDIX C

BORING LOGS FOR GROUNDWATER MONITORING WELLS

Shaw
Shaw E & I, Inc.

Drilling Log

Monitoring Well **LEGEND**

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Surface Elev. NA Total Hole Depth 75.0 ft. North East

Top of Casing NA Water Level Initial NA Static NA Diameter

Screen: Dia NA Length NA Type/Size Sch 40 PVC/0.020

Casing: Dia NA Length NA Type NA

Fill Material Well Sand (#2, #00), Bentonite, Grout Rig/Core Drill Rig

Drill Co. Aquifer Drilling&Testing Method Hollow Stem Auger

Driller NA Log By NA Date Permit # NA

Checked By License No.

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							STEEL FLUSH-MOUNT OR STICK-UP
							2" LOCKING EXPANSION CAP
10							CEMENT AND BENTONITE GROUT
20							
30							
40							2" PVC RISER
50							
60							BENTONITE SEAL
							#00 SAND FILTER
							#2 SAND PACK
70							#10-2" PVC WELL SCREEN
80							

Drilling Log

Monitoring Well **MW SCA-14D**

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Surface Elev. NA Total Hole Depth 148.0 ft. North East

Top of Casing NA Water Level Initial NA Static NA Diameter

Screen: Dia 2 in. Length 15 ft. Type/Size Sch 40 PVC/0.020

Casing: Dia 2 in. Length 137.5 ft. Type PVC

Fill Material Well Sand (#2, #00), Bentonite, Grout Rig/Core Drill Rig

Drill Co. Aquifer Drilling&Testing Method Hollow Stem Auger

Driller S. Miller, E. Moise Log By D. Giovanetti Date 1/7/03 Permit # NA

Checked By License No.

COMMENTS
Well construction details: bentonite seal #00 Sand Filter and #2 Sand Pack.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0		0.0	0'-58'			TOPSOIL	Topsoil. Orange/brown coarse to fine SAND and clayey Silt (moist-wet).
5						SP	
10						SP	Brown coarse to fine SAND, little Silt, cobbles (moist).
15						SP	
20						SP	Brown coarse to fine SAND, little coarse to fine Gravel, little Silt (moist).
25						SP	Brown coarse to fine SAND, trace Silt (moist).
30						SP	
35						SP	Brown coarse to fine SAND, trace Silt , trace Gravel (moist).
40						SP	
45						SP	
50						SP	Light brown coarse to fine SAND, trace Silt (moist).
55							

Continued Next Page

Drilling Log

Monitoring Well **MW SCA-14D**

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55						SP	
60		0.0	58'-60' 25%			SP	Tan medium to fine SAND, trace Silt (moist).
65		0.0	63'-65' 10%			SP	Tan medium to fine SAND, trace Silt (moist).
70		0.0	68'-70' 50%			SP	Tan medium to fine SAND, trace Silt (wet).
75		0.0	73'-75' 50%			SP	Tan coarse to fine SAND, trace Silt (wet).
80		0.0	78'-80' 60%			SP	Tan coarse to fine SAND (wet).
85		0.0	83'-85' 100%			SP	Brown coarse to fine SAND, trace Silt (wet).
90		0.0	88'-90' 50%			SP	Tan coarse to fine SAND (wet).
95		0.0	93'-95' 65%			SP	Tan coarse to fine SAND, trace Silt (wet).
100		0.0	98'-100' 65%			SP	Tan medium to fine SAND, trace Silt (wet).
105		0.0	103'-105' 50%			SP	Tan coarse to fine SAND, trace Silt (wet).
110		0.0	108'-110' 65%			SP	Light brown medium to fine SAND, trace Silt (wet).
115		0.0	113'-115' 65%			SP	Light brown medium to fine SAND, trace Silt (wet).
120		0.0	118'-120' 60%			SP	Light brown medium to fine SAND, trace Silt (wet).
125		0.0	123'-125' 85%			SP	Light brown medium to fine SAND, trace Silt (wet).

Continued Next Page

Drilling Log

Monitoring Well **MW SCA-14D**

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	128'-135' 100%			SP	Brown medium to fine SAND, trace Silt (wet).
135		0.0	133'-135' 60%			SP	Light brown coarse to fine SAND, little fine Gravel, trace Silt (wet).
140		0.0	138'-140' 25%			SP	Light brown coarse to fine SAND, little fine Gravel, trace Silt (wet).
145		0.0	143'-145'			SP	Light brown coarse to fine SAND, trace Gravel, trace Silt (wet).
150		0.0	148'-150' 40%			CL	Gray CLAY (wet).
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

SHAW_E&I_NOUSCS Rev: 10/28/02 SCAMETRO.AVE.GPJ IT_CORP.GDT 2/13/03

Drilling Log

Monitoring Well **MW SCA-14S**

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Surface Elev. NA Total Hole Depth 79.0 ft. North East

Top of Casing NA Water Level Initial NA Static NA Diameter

Screen: Dia 2 in. Length 15 ft. Type/Size Sch 40 PVC/0.020

Casing: Dia 2 in. Length 164.5 ft. Type PVC

Fill Material Well Sand (#2, #00), Bentonite, Grout Rig/Core Drill Rig

Drill Co. Aquifer Drilling&Testing Method Hollow Stem Auger

Driller Dennis Mayer Log By D. Giovanetti Date 1/11/03 Permit # NA

Checked By License No.

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							Topsoil. Orange/brown coarse to fine SAND and clayey Silt (moist).
5							
10							Brown coarse to fine SAND, little Silt, with cobbles (moist).
15							
20							Brown coarse to fine SAND, little coarse to fine Gravel, little Silt (moist).
25							
30							
35							
40							
45							
50							Brown coarse to fine SAND, trace Silt, trace Gravel (moist).
55							

Continued Next Page

Drilling Log

Monitoring Well **MW SCA-14S**

Project *SCA Metropolitan Avenue* Owner _____

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55							
60							Tan medium to fine SAND, trace Silt (moist).
65							
70							Tan coarse to fine SAND, trace Silt (wet).
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							
125							

Drilling Log

Monitoring Well **MW SCA-14I**

Project: SCA Metropolitan Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 110.0 ft. | North: | East:
Top of Casing: NA | Water Level Initial: NA | Static: NA | Diameter:
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020
Casing: Dia: 2 in. | Length: 97.5 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling&Testing | Method: Hollow Stem Auger
Driller: Dennis Mayer | Log By: D. Giovanetti | Date: 1/9/03 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) — Geologic Descriptions are Based on the USCS.
0							Topsoil. Orange/brown coarse to fine SAND and clayey Silt (moist).
10							Brown coarse to fine SAND, little Silt, with cobbles (moist).
20							Brown coarse to fine SAND, little coarse to fine Gravel, little Silt (moist).
50							Brown coarse to fine SAND, trace Silt, trace Gravel (moist).

Continued Next Page

Drilling Log

Monitoring Well **MW SCA-14I**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55							
60							Tan medium to fine SAND, trace Silt (moist).
65							
70							
75							
80							Brown coarse to fine SAND, trace Silt (wet).
85							
90							
95							
100							Tan medium to fine SAND, trace Silt (moist).
105							
110							
115							
120							
125							

Drilling Log

Monitoring Well **MW SCA-15S**

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Surface Elev. NA Total Hole Depth 82.0 ft. North East

Top of Casing NA Water Level Initial NA Static NA Diameter

Screen: Dia 2 in. Length 15 ft. Type/Size Sch 40 PVC/0.020

Casing: Dia 2 in. Length 67 ft. Type PVC

Fill Material Well Sand (#2, #00), Bentonite, Grout Rig/Core Drill Rig

Drill Co. Aquifer Drilling&Testing Method Hollow Stem Auger

Driller Dennis Mayer Log By D. Giovanetti Date 1/6/03 Permit # NA

Checked By License No.

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							GRAVEL and Asphalt debris. Orange/brown clayey SILT, some coarse to fine Sand (moist).
10							Orange/brown coarse to fine SAND, some coarse to fine Gravel, little clayey Silt (moist).
20							Brown coarse to fine SAND, some coarse to fine Gravel, little Silt (moist).
50							Brown coarse to fine SAND, trace coarse to fine Gravel, trace Silt (moist).

Continued Next Page

Shaw

Shaw E&I, Inc.

Drilling Log

Monitoring Well **MW SCA-15S**

Project *SCA Metropolitan Avenue* Owner _____

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery / Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS
55						*Continued*
60						Tan coarse to fine SAND, trace Silt (wet).
65						
70						
75						
80						
85						
90						
95						
100						
105						
110						
115						
120						
125						

Drilling Log

Monitoring Well **SCA-15D**

Project: SCA Metropolitan Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 145.0 ft. | North: | East:
Top of Casing: NA | Water Level Initial: NA | Static: NA | Diameter:
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020
Casing: Dia: 2 in. | Length: 131 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling&Testing | Method: Hollow Stem Auger
Driller: Dennis Mayer | Log By: D. Giovanetti | Date: 1/8/03 | Permit #: NA
Checked By: | License No.:

COMMENTS
Well construction details: bentonite seal #00 Sand Filter and #2 Sand Pack.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) — Geologic Descriptions are Based on the USCS
0		0.0	0'-58'			FILL	GRAVEL and Asphalt debris. Orange/brown coarse to fine SAND, some clayey Silt, little coarse to fine Gravel (moist).
5						SP	
10						FILL	CONCRETE, refusal moved location 4' North. Brown coarse to fine SAND, some coarse to fine Gravel, little clayey Silt, freqvent boulders or cobbles, hard drilling (moist).
15							
20						SP	
25							
30							Brown coarse to fine SAND, little coarse to fine Gravel, trace Silt (moist).
35							
40						SP	
45							
50							Light brown coarse to fine SAND, trace Silt (moist).
55						SP	

Continued Next Page

Drilling Log

Monitoring Well **SCA-15D**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55						SP	
60		0.0	58'-60' 60%			SP	Tan coarse to fine SAND, trace Silt (moist).
		0.0	63'-65' 65%			SP	Tan coarse to fine SAND, trace Silt (moist).
65							
		0.0	68'-70' 50%			SP	Tan coarse to fine SAND, trace Silt (moist), wet in tip of spoon.
70							
		0.0	73'-75' 100%			SP	Tan medium to fine SAND, trace Silt (wet).
75							
		0.0	78'-80' 85%			SP	Tan coarse to fine SAND, little medium to fine Gravel, trace Silt (wet).
80							
		0.0	83'-85' 50%			SP	Tan coarse to fine SAND, little medium to fine Gravel, trace Silt (wet).
85							
		0.0	88'-90' 50%			SP	Tan coarse to fine SAND, trace Silt (wet).
90							
		0.0	93'-95' 60%			SP	Tan coarse to fine SAND, trace Silt (wet).
95							
		0.0	98'-100' 60%			SP	Tan medium to fine SAND, trace Silt (wet).
100							
		0.0	103'-105'			SP	Tan/gray coarse to fine SAND, little medium to fine Gravel, trace Silt (wet).
105							
		0.0	108'-110' 50%			SP	Tan/gray coarse to fine SAND, trace Silt (wet).
110							
		0.0	113'-115' 65%			SP	Tan/gray coarse to fine SAND, trace Silt (wet).
115							
		0.0	118'-120' 65%			SP	Brown medium to fine SAND, trace Silt (wet).
120							
		0.0	123'-125' 40%			SP	Orange/brown medium to fine SAND, little Silt (wet).
125							

Continued Next Page

Shaw

Shaw E&I, Inc.

Drilling Log

Monitoring Well **SCA-15D**

Project *SCA Metropolitan Avenue* Owner _____

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	128'-130' 25%	50/6"		SP	Orange/brown coarse to fine SAND, little coarse to fine Gravel, little Silt (wet).
135		0.0	133'-135' 25%	50/2"		SP	Orange/brown coarse to fine SAND, little coarse to fine Gravel, little Silt (wet).
140		0.0	138'-140'	75/3"		SP	Orange/brown coarse to fine SAND, little coarse to fine Gravel, little Silt (wet).
145		0.0	143'-145' 60%	25/5"		SP	Top 2" orange/brown medium SAND, little Silt (wet).
150						CL	Gray CLAY (moist).
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

HAW_E&I_NOUSCS Rev: 10/28/02 SCAMETRO.AVE.GPJ IT_CORP.GDT 2/13/03

Drilling Log

Monitoring Well **SCA-15I**

Project: SCA Metropolitan Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 110.0 ft. | North: | East:
Top of Casing: NA | Water Level Initial: NA | Static: NA | Diameter:
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020
Casing: Dia: 2 in. | Length: 95 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling&Testing | Method: Hollow Stem Auger
Driller: Shawn Miller | Log By: D. Giovanetti | Date: 1/10/03 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							GRAVEL and Asphalt debris. Orange/brown coarse to fine SAND, some clayey Silt, little coarse to fine Gravel (moist).
10							Brown coarse to fine SAND, some coarse to fine Gravel, little clayey Silt, freqvent cobbles (moist).
30							Brown coarse to fine SAND, little coarse to fine Gravel, little Silt (moist).

Continued Next Page

Drilling Log

Monitoring Well **SCA-15I**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS
							Continued
55							
60							Tan coarse to fine SAND, trace Silt (moist).
65							
70							
75							Tan coarse to fine SAND, trace Silt (wet).
80							
85							
90							
95							
100							
105							
110							
115							
120							
125							

Drilling Log

Monitoring Well **SCA-16D**

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Surface Elev. NA Total Hole Depth 150.0 ft. North East

Top of Casing NA Water Level Initial NA Static NA Diameter

Screen: Dia 2 in. Length 15 ft. Type/Size Sch 40 PVC/0.020

Casing: Dia 2 in. Length 135 ft. Type PVC

Fill Material Well Sand (#2, #00), Bentonite, Grout Rig/Core Drill Rig

Drill Co. Aquifer Drilling&Testing Method Hollow Stem Auger

Driller Shawn Miller Log By D. Giovanetti, R. Rolston Date 1/15/03 Permit # NA

Checked By License No.

COMMENTS
Well construction details: bentonite seal #00 Sand Filter and #2 Sand Pack.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0		0.0	0'-63'			SP	6" Asphalt. Brown coarse to fine SAND, little coarse to fine Gravel, little Silt, with cobbles (moist).
5						SP	
10							Brown coarse to fine SAND, little coarse to fine Gravel, trace Silt.
15						SP	
20							
25							Brown coarse to fine SAND, trace Silt.
30						SP	
35							Brown coarse to fine SAND, trace Silt (moist).
40							
45						SP	
50							
55							

SHAW_E&I_NOUSCS Rev: 10/28/02 SCAMETRO_AVE.GPJ IT_CORP.GDT 2/13/03

Drilling Log

Monitoring Well **SCA-16D**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55						SP	
60						SP	Light brown coarse to fine SAND, trace Gravel, trace Silt (dry).
65		0.0	63'-65'			SP	Light brown coarse to fine SAND, trace Gravel, trace Silt (dry).
70		0.0	68'-70'			SP	Gray medium to fine SAND, trace Silt (wet).
75		0.0	73'-75'			SP	Light brown medium to fine SAND, trace Gravel, trace Silt (wet).
80		0.0	78'-80'			SP	Light brown medium to fine SAND, trace Gravel, trace Silt (wet).
85		0.0	83'-85' 50%			SP	Gray medium to fine SAND, trace Silt (wet).
90		0.0	88'-90' 60%			SP	Gray medium to fine SAND, trace Silt (wet).
95		0.0	93'-95' 55%			SP	Gray medium to fine SAND, trace Silt, (wet).
100		0.0	98'-100' 50%			SP	Brown/gray coarse SAND, trace Silt (wet).
105		0.0	103'-105' 65%			SP	Brown coarse to fine SAND, trace Silt (wet).
110		0.0	108'-110' 25%			SP	Brown coarse to fine SAND, trace Silt (wet).
115		0.0	113'-115' 75%			SP	Brown coarse to fine SAND, trace Silt (wet).
120		0.0	118'-120' 35%			SP	Brown coarse to fine SAND, trace Silt (wet).
125		0.0	123'-125' 25%			SP	Brown coarse to fine SAND, trace Silt (wet).

Drilling Log

Monitoring Well **SCA-16D**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	128'-130' 35%			SP	Brown coarse to fine SAND, trace Silt (wet).
135		0.0	133'-135' 50%			SP	Brown coarse to fine SAND, trace Silt (wet).
140		0.0	138'-140' 50%			SP	Brown coarse to fine SAND, little coarse to fine Gravel, trace Silt (wet).
145		0.0	143'-145' 60%			SP	Brown coarse to fine SAND, little fine Gravel, trace Silt (wet).
150		0.0	148'-150' 25%			SP	Gray CLAY, trace fine Gravel (moist).
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

Shaw

Shaw E&I Inc.

Drilling Log

Monitoring Well SCA-16I

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Surface Elev. NA Total Hole Depth 110.0 ft. North East

Top of Casing NA Water Level Initial NA Static NA Diameter

Screen: Dia 2 in. Length 15 ft. Type/Size Sch 40 PVC/0.020

Casing: Dia 2 in. Length 95 ft. Type PVC

Fill Material Well Sand (#2, #00), Bentonite, Grout Rig/Core Drill Rig

Drill Co. Aquifer Drilling&Testing Method Hollow Stem Auger

Driller Shawn Miller Log By D. Giovanetti Date 1/17/03 Permit # NA

Checked By License No.

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							Asphalt.
5							Brown coarse to fine SAND, some Silt, little coarse to fine Gravel (moist).
10							
15							
20							
25							Brown coarse to fine SAND, trace coarse to fine Gravel, trace Silt (moist).
30							
35							
40							
45							
50							
55							

Continued Next Page

Drilling Log

Monitoring Well **SCA-16I**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS
55							*Continued*
60							
65							Brown coarse to fine SAND, trace Silt (moist).
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							
125							

Drilling Log

Monitoring Well **SCA-16S**

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Surface Elev. NA Total Hole Depth 84.0 ft. North East

Top of Casing NA Water Level Initial NA Static NA Diameter

Screen: Dia 2 in. Length 15 ft. Type/Size Sch 40 PVC/0.020

Casing: Dia 2 in. Length 69 ft. Type PVC

Fill Material Well Sand (#2, #00), Bentonite, Grout Rig/Core Drill Rig

Drill Co. Aquifer Drilling&Testing Method Hollow Stem Auger

Driller Dennis Mayer Log By D. Giovanetti Date 1/15/03 Permit # NA

Checked By License No.

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							ASPHALT.
5							Brown coarse to fine SAND and Silt, little coarse to fine Gravel (moist).
10							
15							
20							
25							Brown coarse to fine SAND, little coarse to fine Gravel, trace Silt (moist).
30							
35							
40							
45							
50							
55							

Continued Next Page

Drilling Log

Monitoring Well **SCA-16S**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
55							*Continued*
60							Brown coarse to fine SAND, trace Gravel, trace Silt (moist).
65							
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							
125							

IT CORPORATION

Drilling Log

Monitoring Well SCA-9I

Project: SCA Metropolitan Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 107.0 ft. | North: -45871.71 ft. | East: 42671.33 ft.
Top of Casing: 74.72 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.
Casing: Dia: 2 in. | Length: 92 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling & Testing | Method: Hollow Stem Auger
Driller: C. Stratten | Log By: B. Fritz | Date: 6/3/02 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							
100							
110							

IT CORPORATION

Drilling Log

Monitoring Well SCA-9D

Project: SCA Metropoliten Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 145.0 ft. | North: -45877.66 ft. | East: 42681.99 ft.
Top of Casing: 74.05 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.
Casing: Dia: 2 in. | Length: 130 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling & Testing | Method: Hollow Stem Auger
Driller: C. Stratten | Log By: B. Fritz | Date: 6/3/02 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
5							
10							
15							
20							
25		0.0	0'-58'				
30							
35							
40							
45							
50							
55							

IT CORPORATION

Drilling Log

Monitoring Well **SCA-9D**

Project *SCA Metropoliten Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS
							Continued
55		0.0	0'-58'				
		0.0	58'-60' 75%	6 11 12 12		SP	Brown damp medium to fine SAND, trace fine sand.
60						SP	Light brown dry fine SAND.
		0.0	63'-65' 75%	11 12 14 16		SP	Light brown saturated medium SAND, little fine sand.
65							
		0.0	68'-70' 80%	9 8 8 7		SP	Light brown saturated medium SAND, little fine sand.
70						SP	Light brown moist clay, 1" rock at 68'8", 50 blow counts over 2" occurred.
		0.0	73'-75' 80%	7 6 6 7		SP	Light brown saturated coarse SAND, some medium sand.
75							
		0.0	78'-80' 100%	6 7 8 8		SP	Light brown saturated coarse SAND, some medium sand, 1" clay/medium sand layer at 79' bg.
80							
		0.0	83'-85' 100%	17 34 50/4"		SP	Light brown saturated medium and coarse SAND, 50 blow counts over 4" occurred.
85							
		0.0	88'-90' 100%	17 50/2"		SP	Light brown saturated medium SAND, 50 blow counts over 2" occurred.
90							
		0.0	93'-95' 100%	10 8 13 18		SP	Light brown saturated medium SAND.
95							
		0.0	98'-100' 60%	3 3 5 6		SP	Light brown saturated medium SAND.
100							
		0.0	103'-105' 60%	8 8 14 14		SP	Light brown saturated medium SAND.
105							
		0.0	108'-110' 50%	2 3 3 12		SP	Light brown saturated medium SAND.
110							
		0.0	113'-115' 80%	4 4 4 16		SP	Light brown saturated medium SAND.
115							
		0.0	118'-120' 100%	5 5 7 12		SP	Light brown saturated medium SAND.
120							
		0.0	123'-125' 90%	6 5 5 10		SP	Light brown saturated medium to fine SAND.
125							

IT CORPORATION

Drilling Log

Monitoring Well SCA-9D

Project *SCA Metropoliten Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	128'-130' 100%			SP	Light brown saturated medium SAND.
135		0.0	133'-135' 80%			SP/GP	Light brown saturated medium SAND, little coarse gravel.
140		0.0	138'-140' 80%			SP	Light brown saturated medium to fine SAND.
145		0.0	143'-145' 100%			SP CL	Light brown saturated medium to fine SAND. Light gray damp CLAY.
150							
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

IT CORPORATION

Drilling Log

Monitoring Well SCA-10S

Project: SCA Metropoliten Avenue | Owner:

Location: Forest Hills, Queens, New York | Proj. No.: 837411

Surface Elev.: NA | Total Hole Depth: 80.0 ft. | North: 45948.65 ft. | East: 43475.74 ft.

Top of Casing: 82.77 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.

Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.

Casing: Dia: 2 in. | Length: 65 ft. | Type: PVC

Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig

Drill Co.: Aquifer Drilling & Testing | Method: Hallow Stem Auger

Driller: C. Stratten | Log By: B. Fritz | Date: 6/13/02 | Permit #: NA

Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							

IT CORPORATION

Drilling Log

Monitoring Well SCA-10I

Project SCA Metropoliten Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Surface Elev. NA Total Hole Depth 110.0 ft. North 45948.78 ft. East 43469.3 ft.

Top of Casing 82.78 ft. Water Level Initial NA Static NA Diameter 8.5 in.

Screen: Dia 2 in. Length 15 ft. Type/Size Sch 40 PVC/0.020 in.

Casing: Dia 2 in. Length 95 ft. Type PVC

Fill Material Well Sand (#2, #00), Bentonite, Grout Rig/Core Drill Rig

Drill Co. Aquifer Drilling & Testing Method Hallow Stem Auger

Driller C. Stratten Log By B. Fritz Date 6/12/02 Permit # NA

Checked By License No.

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							
100							
110							

IT CORPORATION

Drilling Log

Monitoring Well SCA-10D

Project SCA Metropoliten Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Surface Elev. NA Total Hole Depth 150.0 ft. North -45949 ft. East 43473.55 ft.

Top of Casing 82.73 ft. Water Level Initial NA Static NA Diameter 8.5 in.

Screen: Dia 2 in. Length 15 ft. Type/Size Sch 40 PVC/0.020 in.

Casing: Dia 2 in. Length 130 ft. Type PVC

Fill Material Well Sand (#2, #00), Bentonite, Grout Rig/Core Drill Rig

Drill Co. Aquifer Drilling & Testing Method Hollow Stem Auger

Driller C. Stratten Log By B. Fritz Date 6/11/02 Permit # NA

Checked By License No.

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
5							
10							
15							
20							
25		0.0	0'-58'				
30							
35							
40							
45							
50							
55							

IT CORPORATION

Drilling Log

Monitoring Well **SCA-10D**

Project SCA Metropoliten Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55		0.0	0'-58'				
60		0.0	58'-60' 40%	12 15 18 17		SP	Light brown dry medium to fine SAND.
65		0.0	63'-65' 60%	10 11 16 16		SP	Light brown dry medium to fine SAND.
70		0.0	68'-70' 80%	15 25 27 30		SP SP	Light brown dry medium to fine SAND. Light brown damp medium SAND.
75		0.0	73'-75' 80%	16 28 28 29		SP SP	Light brown saturated medium SAND. Light brown saturated fine SAND.
80		0.0	78'-80' 70%	16 15 27 37		SP	Light brown saturated medium SAND.
85		0.0	83'-85' 90%	10 20 24 30		SP	Light brown saturated medium SAND, little coarse sand.
90		0.0	88'-90' 90%	8 15 23 20		SP	Light brown saturated medium SAND, little coarse sand.
95		0.0	93'-95' 90%	9 27 37		SP	Light brown saturated medium SAND, some coarse sand.
100		0.0	98'-100' 50%	6 9 21		SP	Light brown saturated medium SAND, some coarse sand.
105		0.0	103'-105' 60%	12 16 16 24		SP	Light brown saturated medium SAND, some coarse sand.
110		0.0	108'-110' 70%	15 15 16 15		SP	Light brown saturated coarse SAND, 1" rock at 109' 9" below grade.
115		0.0	113'-115' 50%	6 7 8		SP	Light brown saturated coarse to medium SAND.
120		0.0	118'-120' 40%	15 17 22		SP	Light brown saturated medium SAND, little coarse sand.
125		0.0	123'-125' 40%	6 8 13 27		SP	Light brown saturated medium to fine SAND.

Continued Next Page

IT CORPORATION

Drilling Log

Monitoring Well SCA-10D

Project *SCA Metropoliten Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS
							Continued
130		0.0	128'-130' / 60%			SP	Light brown saturated medium SAND, some coarse sand.
135		0.0	133'-135' / 100%			SP / SP/GP	Brown saturated fine SAND, trace medium sand. Brown saturated coarse SAND, trace medium sand, trace medium gravel.
140		0.0	138'-140' / 65%			SP	Brown saturated medium SAND, trace coarse sand.
145		0.0	143'-145' / 100%			SP	Brown saturated medium and fine SAND.
150		0.0	148'-150' / 25%			SP	Orange to brown saturated fine SAND.
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

COMMERCIAL_NOUSCS Rev: 2/23/00 SCAMETRO.GPJ IT_CORP.GDT 9/9/02

IT CORPORATION

Drilling Log

Monitoring Well SCA-11S

Project: SCA Metropoliten Avenue | Owner:

Location: Forest Hills, Queens, New York | Proj. No.: 837411

Surface Elev.: NA | Total Hole Depth: 80.0 ft. | North: 45879.57 ft. | East: 43101.08 ft.

Top of Casing: 75.97 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.

Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.

Casing: Dia: 2 in. | Length: 65 ft. | Type: PVC

Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig

Drill Co.: Aquifer Drilling & Testing | Method: Hallow Stem Auger

Driller: C. Stratten | Log By: B. Fritz | Date: 6/21/02 | Permit #: NA

Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery / Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0						
10						
20						
30						
40						
50						
60						
70						
80						
90						

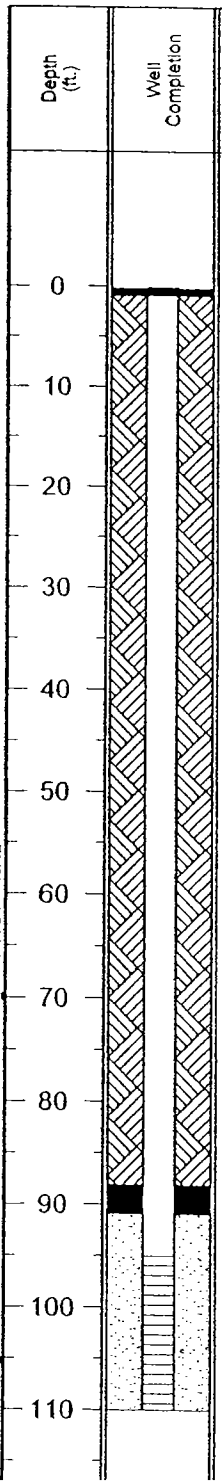
IT CORPORATION
(A Member of The IT Group)

Drilling Log

Monitoring Well SCA-11I

Project: SCA Metropoliten Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 110.0 ft. | North: -45880.11 ft. | East: 43105.16 ft.
Top of Casing: 75.82 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.
Casing: Dia: 2 in. | Length: 95 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling & Testing | Method: Hallow Stem Auger
Driller: C. Stratten | Log By: B. Fritz | Date: 6/30/02 | Permit #: NA
Checked By: | License No.:

COMMENTS



Description

(Color, Texture, Structure)

Geologic Descriptions are Based on the USCS.

COMMERCIAL_NOUSCS Rev: 2/23/00 SCAMETRO.GPJ IT_CORP.GDT 9/5/02

IT CORPORATION

Drilling Log

Monitoring Well SCA-11D

Project: SCA Metropoliten Avenue Owner:

Location: Forest Hills, Queens, New York Proj. No.: 837411

Surface Elev.: NA Total Hole Depth: 150.0 ft. North: -45878.31 ft. East: 43095.26 ft.

Top of Casing: 76.11 ft. Water Level Initial: NA Static: NA Diameter: 8.5 in.

Screen: Dia: 2 in. Length: 15 ft. Type/Size: Sch 40 PVC/0.020 in.

Casing: Dia: 2 in. Length: 135 ft. Type: PVC

Fill Material: Well Sand (#2, #00), Bentonite, Grout Rig/Core: Drill Rig

Drill Co.: Aquifer Drilling & Testing Method: Hollow Stem Auger

Driller: C. Stratten Log By: B. Fritz Date: 6/19/02 Permit #: NA

Checked By: License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
5							
10							
15							
20							
25		0.0	0'-58'				
30							
35							
40							
45							
50							
55							

IT CORPORATION

Drilling Log

Monitoring Well **SCA-11D**

Project *SCA Metropoliten Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS
							Continued
55		0.0	0'-58'				
60		0.0	58'-60' 50%			SP	Light brown dry medium SAND, little fine sand.
65		0.0	63'-65' 50%			SP	Light brown dry medium SAND, some fine sand.
70		0.0	68'-70' 50%			SP	Light brown saturated medium SAND, little coarse gravel.
75		0.0	73'-75' 50%			SP	Light brown saturated medium SAND, little coarse gravel.
80		0.0	78'-80' 40%			SP	Light brown saturated medium SAND, trace fine sand.
85		0.0	83'-85' 80%			SP	Light brown saturated medium SAND, little coarse sand.
90		0.0	88'-90'				No sample collected due to flowing sands entering into augers.
95		0.0	93'-95'				No sample collected due to flowing sands entering into augers.
100		0.0	98'-100' 50%			SP	Light borwn saturated medium SAND.
105		0.0	103'-105' 80%			SP	Light borwn saturated medium SAND, little fine sand.
110		0.0	108'-110' 100%			SP	Light borwn saturated fine SAND, little medium sand.
115		0.0	113'-115' 90%			SP	Light borwn saturated fine SAND, little medium sand.
120		0.0	118'-120'				No sample collected due to flowing sands entering into augers.
125		0.0	123'-125' 100%			SP	Light borwn saturated fine SAND, little medium sand.

IT CORPORATION

Drilling Log

Monitoring Well **SCA-11D**

Project *SCA Metropoliten Avenue* Owner _____

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	128'-130' 100%			SP	Orange/brown saturated fine SAND, little medium sand.
135		0.0	133'-135' 100%			SP/GP	Orange/brown saturated medium SAND, little coarse gravel.
140		0.0	138'-140' 100%			SP/GP	Orange/brown saturated medium SAND, some coarse gravel, little fine sand.
145		0.0	143'-145' 100%			SP/GP	Orange saturated medium SAND, trace coarse gravel.
150		0.0	148'-150' 60%			SP/GP CL	Orange saturated medium SAND, some coarse gravel. Gray damp CLAY.
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

IT CORPORATION

Drilling Log

Monitoring Well SCA-12S

Project: SCA Metropoliten Avenue | Owner:

Location: Forest Hills, Queens, New York | Proj. No.: 837411

Surface Elev.: NA | Total Hole Depth: 87.0 ft. | North: -46068.05 ft. | East: 43419.77 ft.

Top of Casing: 81.93 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.

Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.

Casing: Dia: 2 in. | Length: 72 ft. | Type: PVC

Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig

Drill Co.: Aquifer Drilling & Testing | Method: Hollow Stem Auger

Driller: C. Stratten | Log By: B. Fritz | Date: 8/15/02 | Permit #: NA

Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							

IT CORPORATION

Drilling Log

Monitoring Well SCA-12I

Project: SCA Metropoliten Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 110.0 ft. | North: 46063.08 ft. | East: 43421.46 ft.
Top of Casing: 81.64 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.
Casing: Dia: 2 in. | Length: 93 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling & Testing | Method: Hallow Stem Auger
Driller: D. Mayer | Log By: B. Fritz | Date: 8/6/02 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							
100							
110							

IT CORPORATION

Drilling Log

Monitoring Well SCA-12D

Project: SCA Metropoliten Avenue | Owner:

Location: Forest Hills, Queens, New York | Proj. No.: 837411

Surface Elev.: NA | Total Hole Depth: 155.0 ft. | North: -46064.73 ft. | East: 43417.1 ft.

Top of Casing: 81.82 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.

Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.

Casing: Dia: 2 in. | Length: 139 ft. | Type: PVC

Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig

Drill Co.: Aquifer Drilling & Testing | Method: Hollow Stem Auger

Driller: C. Stratten | Log By: B. Fritz | Date: 7/31/02 | Permit #: NA

Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
5							
10							
15							
20							
25		0.0	0'-58'				
30							
35							
40							
45							
50							
55							

IT CORPORATION

Drilling Log

Monitoring Well SCA-12D

Project SCA Metropoliten Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55		0.0	0'-58'				
60		0.0	60'-62' 35%			SP	Light brown moist medium to fine SAND, trace silt
65		0.0	65'-67' 25%			SP	Light brown moist medium to fine SAND, trace silt
70		0.0	70'-72' 0%	8			No recovery.
75		0.0	75'-77' 100%			SP	Brown saturated medium to fine SAND, trace silt.
80		0.0	80'-82' 100%			SP	Tan saturated coarse to fine SAND, trace silt.
85		0.0	85'-87' 60%			SP	Brown saturated medium to fine SAND, trace silt.
90		0.0	90'-92' 65%			SP/GP	Tan saturated coarse to fine SAND, trace gravel.
95		0.0	95'-97' 50%			SP/GP	Tan saturated coarse to fine SAND, trace gravel.
100		0.0	100'-102' 35%			SP/GP	Tan saturated coarse to fine SAND, trace gravel.
105		0.0	105'-107' 55%			SP/GP	Tan saturated coarse to fine SAND, trace gravel.
110		0.0	110'-112' 65%			SP/GP	Tan saturated coarse to fine SAND, trace gravel.
115		0.0	115'-117' 65%			SP	Tan saturated coarse to fine SAND.
120		0.0	120'-122' 50%			SP	Tan saturated coarse to fine SAND.
125		0.0	125'-127' 75%			SP	Tan saturated coarse to fine SAND.

IT CORPORATION

Drilling Log

Monitoring Well SCA-12D

Project SCA Metropoliten Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	130'-132' 85%			SP	Tan saturated coarse to fine SAND, little coarse gravel.
135		0.0	135'-137' 75%			SP/GP	Brown saturated medium to fine SAND, trace silt.
140		0.0	140'-142' 65%			SP/GP	Brown saturated coarse to fine SAND, little medium to fine gravel.
145		0.0	145'-147' 0%			SP	No recovery
150		0.0	148'-150' 20%			CL	Brown saturated medium to fine SAND
		0.0	153'-153.5' 100%	7 8		CL	Grey CLAY, some course to fine gravel, little orange/brown coarse to fine sand
		0.0	154'-154.5' 100%			CL	Green/grey silty CLAY, trace fine sand.
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

IT CORPORATION

Drilling Log

Monitoring Well SCA-13S

Project: SCA Metropoliten Avenue | Owner:

Location: Forest Hills, Queens, New York | Proj. No.: 837411

Surface Elev.: NA | Total Hole Depth: 82.0 ft. | North: -46039.07 ft. | East: 43535.29 ft.

Top of Casing: 77.83 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.

Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.

Casing: Dia: 2 in. | Length: 67 ft. | Type: PVC

Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig

Drill Co.: Aquifer Drilling & Testing | Method: Hollow Stem Auger

Driller: C. Stratten | Log By: B. Fritz | Date: 8/16/02 | Permit #: NA

Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery / Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0						
10						
20						
30						
40						
50						
60						
70						
80						
90						

IT CORPORATION

Drilling Log

Monitoring Well SCA-13I

Project: SCA Metropoliten Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 110.0 ft. | North: -46034.71 ft. | East: 43529.34 ft.
Top of Casing: 77.84 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.
Casing: Dia: 2 in. | Length: 95 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling & Testing | Method: Hollow Stem Auger
Driller: C. Stratten | Log By: B. Fritz | Date: 8/9/02 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure). Geologic Descriptions are Based on the USCS.
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							
100							
110							

IT CORPORATION

Drilling Log

Monitoring Well SCA-13D

Project: SCA Metropoliten Avenue | Owner:

Location: Forest Hills, Queens, New York | Proj. No.: 837411

Surface Elev.: NA | Total Hole Depth: 148.0 ft. | North: -46030.44 ft. | East: 43536.3 ft.

Top of Casing: 78.48 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.

Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.

Casing: Dia: 2 in. | Length: 133 ft. | Type: PVC

Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig

Drill Co.: Aquifer Drilling & Testing | Method: Hollow Stem Auger

Driller: C. Stratten | Log By: B. Fritz | Date: 7/31/02 | Permit #: NA

Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
5							
10							
15							
20							
25		0.0	0'-58'				
30							
35							
40							
45							
50							
55							

Continued Next Page

IT CORPORATION

Drilling Log

Monitoring Well **SCA-13D**

Project SCA Metropoliten Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55		0.0	0'-58'				
60		0.0	60'-62' 15%	18		SP	Brown dry coarse to fine SAND and SILT, trace clay.
65		0.0	63'-65' 50%	3 12 28		SP	Tan/brown moist coarse to fine SAND.
70		0.0	68'-70' 60%	14 18 22 16		SP	Tan/brown saturated coarse to fine SAND.
75		0.0	73'-75' 100%	16 18 18 18		SP	Tan/brown saturated coarse to fine SAND.
80		0.0	78'-80' 50%	6 6 6 12		SP	Tan/brown saturated coarse to fine SAND.
85		0.0	83'-85' 35%	10 12 16 18		SP/GP	Light brown saturated coarse to fine SAND, little medium to fine gravel.
90		0.0	89'-91' 65%	12 16 18 21		SP	Light brown saturated coarse to fine SAND.
95		0.0	93'-95' 65%	4 6 10 12		SP/GP	Tan saturated coarse to fine SAND, little coarse to fine gravel.
100		0.0	98'-100' 50%	4 4 8 11		SP	Tan saturated coarse to fine SAND.
105		0.0	103'-105' 40%	5 7 9 12		SP	Tan saturated coarse to fine SAND.
110		0.0	108'-110' 0%	7 7 11 9			No recovery.
115		0.0	113'-115' 40%	5 7 9 7		SP	Tan saturated coarse to fine SAND.
120		0.0	118'-120' 85%	4 5 8 10		SP	Tan saturated coarse to fine SAND.
125		0.0	123'-125' 55%	7 9 8 5		SP	Tan saturated coarse to fine SAND.

Drilling Log

Monitoring Well SCA-13D

Project SCA Metropoliten Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	128'-130' 70%	6 11? 17		SP	Brown saturted coarse to fine SAND.
135		0.0	133'-135' 60%	6 5 8? 9		SP/GP	Brown saturted coarse to fine SAND.
140		0.0	138'-139' 45%	21 100		SP/GP	Brown saturated coarse to fine SAND. 100 blow counts were collected over 4".
145		0.0	143'-145' 30%	15 36 32 41		SP/GP	Light brown saturated coarse to fine SAND.
150		0.0	148'-148.5' 100%	100		CL	Grey Clay, little medium to fine gravel.
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

APPENDIX D

ENVIRONMENTAL EASEMENT

APPENDIX E

CD WITH COPY OF RAWP

APPENDIX F

SOIL MANAGEMENT PLAN

SOIL MANAGEMENT PLAN

FOR THE

METROPOLITAN AVENUE SITE
87-01 69TH AVENUE
92-34 METROPOLITAN AVENUE
FOREST HILLS, NEW YORK
BOROUGH OF QUEENS
(VCP AGREEMENT # V-00500-2)
SCA Job No.: 16032
SCA LLW No.: 12545

SEPTEMBER 2007

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
30-30 THOMSON AVENUE
LONG ISLAND CITY, NEW YORK 11101-3045

TABLE OF CONTENTS

Section **Page**

FIGURES:

1.0 INTRODUCTION

1.1 Description of Site

The Site is an approximate 8.25-acre property located at 87-01 69th Avenue and 92-34 Metropolitan Avenue in Forest Hills, New York. The Site consists of an irregular-shaped parcel of land that will be redeveloped into an educational campus consisting of two (2) New York City Public Schools.

1.2 Summary of Voluntary Cleanup Program Activities

Multiple investigations have been conducted at the Site since the mid 1990s which are documented in the Remedial Action Workplan (RAWP) that was completed in November 2002. On June 27, 2007, the New York City School Construction Authority (NYCSCA) entered into a Voluntary Cleanup Program (VCP) Agreement # V-00500-2 with the New York State Department of Environmental Conservation (NYSDEC or the Department). Work completed under the VCP included construction and operation of an air sparging/soil vapor extraction (AS/SVE) system to address groundwater contamination at the Site. The AS/SVE system was operational from April 2005 to March 2007.

Additional information regarding investigations performed at the Site and a description of the Remedial Activities is provided in the November 2002 RAWP and the August 2007 Final Engineering Report (FER).

1.3 Objective of Soil Management Plan

The following Soil Management Plan (the Plan) has been prepared to enable appropriate management of the underlying soils at the Site during any future activities which could breach the composite cover system at the Site. This Soil Management Plan is intended to provide a detailed description of the procedures required to properly manage the soils beneath the composite cover system following completion of the remedial action in the event that future construction activities (i.e., basement construction, underground utility upgrades, landscaping, asphalt or concrete repairs, etc.) are required which might disturb the underlying soils. This Plan includes a description of the area the underlying soils; a description of the composite cover system implemented as part of the remedial action; and protocols to be followed during construction activities which affect the composite cover system.

2.0 SOILS BENEATH COMPOSITE COVER SYSTEM

The surficial soils at the Metropolitan Site are generally characteristic of native sands and gravels. No imported fill material has been identified at the Site. The major contaminants that had been identified at the Site were volatile organic compounds (VOCs), in particular 1,1,1-trichloroethane (TCA) and tetrachloroethene (PCE) which were identified in soils associated with the former Heinz warehouse drainage system as well as drainage piping. The contaminated soils were localized and limited to the northern side of the former warehouse. Historic soil sampling completed elsewhere across the Site indicate sporadic exceedances of several other VOCs (e.g. xylenes); typical PAHs (e.g. benzo(a)pyrene) and several metals such as nickel and zinc. These soils provide the basis for this SoMP.

3.0 DESCRIPTION AND MANAGEMENT OF COMPOSITE COVER SYSTEM

The following section describes the surface composite cover system that will be installed at the Site during construction of the new school building. The purpose of the surface composite cover system is to eliminate the potential for direct human contact with subsurface material and to eliminate the potential for runoff from the property.

3.1 Description of Surface Composite Cover System

As part of the school construction activities, a surface composite cover system will be installed at the Site. This cover system will be comprised of asphalt covered roads, concrete covered sidewalks/walkways, and concrete buildings. In addition, recreational areas will be constructed which will consist of a resilient track surface, synthetic turf, and rubber surfacing. Figures 1 and 2 depict the as built layout of the school and surrounding grounds.

The school building and athletic field/play areas cover the majority of the Site. Areas of the Site that are not covered with these features are landscaped or are occupied by roads and sidewalks/walkways. As detailed on Figures 1 and 2, the following is a description of the major soil cover types that will be constructed across the Site.

- Building slab: The school building is to be constructed on reinforced concrete slab.
- Athletic Field/Play areas: The athletic field will consist of a synthetic field fiber mat underlain with clean crushed stone and pressure treated wood ledger. The play areas will include a poured in place resilient rubber surface or asphalt.
- Sidewalks/walkways: Sidewalks and walkways will consist of reinforced concrete or concrete and asphalt pavers.
- Roadways: Roadway construction will include an asphalt concrete surface and underlying concrete base and aggregate subbase.
- Landscaped areas: At least 2 feet of soil meeting 6 NYCRR Part 375.6.3 Unrestricted Use Soil Cleanup Objectives and contains no detectable VOCs as defined in Section 2.3.2.6 of the SMP (i.e. environmentally clean fill).

3.2 Surface Composite Cover System Management Program

The surface composite cover system at the Site will be maintained in a manner that ensures the system's integrity as originally designed and constructed. The surface composite cover system management program will include routine walk-throughs by the school custodian and annual inspections.

Routine walk-throughs will be performed by the custodian who will identify any observed changes to the composite cover system. In the event of a change in previous conditions, the custodian will log the information and immediately request an inspection, from New York City Department of Education (DOE), Department of School Facilities (DSF). An inspection report will be generated with a report of findings and recommendations.

Annual inspections will be performed by the DOE, DSF in the presence of custodial staff. Based on the results of the inspection and the engineering/environmental assessment, if necessary, the DOE, DSF will determine if design and specifications are required or if the work can be performed by DOE, DSF maintenance staff. If the project requires development of a design and the need to hire an outside contractor, the work will be undertaken by SCA.

Observations of the asphalt, concrete and soil components of the surface composite cover system will be noted during these inspections as detailed below:

A. Asphalt and Concrete: Walk-throughs and annual inspections will be performed for all asphalt and concrete cover system areas of the Site in order to document the presence of any cracks, depressions, and/or exposed soil as a result of deterioration of the asphalt or concrete surface. The damaged areas will be repaired using the appropriate methods within sixty (60) days, weather permitting. Access to any completely breached portions of the surface composite cover system will be restricted and the breached portions of the asphalt and concrete cover system will be repaired utilizing standard dust control techniques within five (5) days weather permitting.

B. Landscaped areas: Walk-throughs and annual inspections will ensure that the underlying soil material in the landscaped areas is not exposed. Examples of exposed material include, depressions or ruts greater than 12-inches in depth. If any damage to the cover is evidenced, but the underlying soil materials are not exposed, the damaged areas will be repaired using the appropriate methods within sixty (60) days of identifying the damage, weather permitting. Access to any completely breached portions of the surface composite cover system will be restricted and the surface composite cover system will be repaired utilizing standard dust control techniques within five (5) days, weather permitting.

3.3 Management of Soils/Fill and Long Term Maintenance of Composite Cover System

The purpose of this section is to provide environmental guidelines for management of subsurface soils and the long-term maintenance of the surface composite cover system during any future intrusive work which breaches the cover system.

The Soil Management Plan includes the following conditions:

- Any breach of the soil cover system, including for the purposes of construction or utilities work, must be replaced or repaired using an acceptable borrow source free of industrial and/or other potential sources of chemical or petroleum contamination. The repaired area must be covered with clean soil and reseeded or covered with an impervious product such as concrete or asphalt, to prevent erosion in the future.

- As further described in Section 4, Site soil that is excavated and is intended to be removed from the property must be managed, characterized, and properly disposed of in accordance with NYSDEC regulations and directives.

- Any off-site material brought to the Site for filling and grading purposes shall meet the definition of environmentally clean soil and backfill as defined in Section 2.3.2.6 of the SMP.

- Prior to any construction activities, workers will be notified of the Site conditions with clear instructions regarding how the work is to proceed. Invasive work performed at the property will be performed in accordance with all applicable local, state and federal regulations to protect worker health and safety.

- If the composite cover system has been breached during the year covered by the Annual Inspection Report, then the DOE, DSF will include a certification in the Annual Inspection Report that all repair work was performed in conformance with this Soil Management Plan.

- The details for the surface cover designs used at the Site are shown in Figures 1 and 2. After completion of invasive work that affects the composite cover system at the Site, the cover system must be replaced and reconstructed in conformance with these surface cover designs.

3.4 Emergency Situations

The DOE, DSF, in the presence of custodial staff, will immediately inspect the cover system, following any emergency situation. Examples of emergency situations include a water main break, emergency utility work, flooding, hurricane, earthquake, etc. The findings will be documented on an Inspection

Form which summarizes inspection observations and recommendations. If the emergency situation resulted in a breach of the soil cover system, the procedure outlined in the previous section will be followed.

3.5 Recordkeeping

The following recordkeeping requirements will be implemented for all cover system inspections at the school. All observations will be noted in a dedicated log book that will include:

- Name of Inspector and/or team members
- Date and Time of Inspection
- Detailed Description of Areas Inspected (Interior and Exterior)
- Observations of Each Area Inspected

Logbook entries will be maintained by custodial staff and include an explanation for any observed physical changes in the condition of the cover system since the last inspection. Observations will include, but not be limited to, cracks in exterior asphalt and concrete; and soil disturbances. The inspection will include photographs, findings, and recommendations for restoration to previous conditions. As part of the yearly inspections, the logbooks will be reviewed, the custodian will be interviewed, and the Annual Inspection Report will be produced in accordance with the requirements of Section 5.4 of the SMP.

The Annual Inspection Report will be completed and submitted to the NYSDEC by March 1st of each year. A copy of the Annual Inspection Report will be provided to the school custodian on the Site. Copies of the Site inspections, assessments, evaluation, monitoring, and Annual Inspection Reports will be maintained at the school custodian's office.

3.6 Notification Requirements

The subject school custodian will be notified at least five (5) business days before conducting activities that may breach the surface cover system. The subject school custodian will notify all concerned parties of the intrusive work. Examples of intrusive work that may breach the surface cover system include landscaping encompassing the removal/replacement of shrubs, bushes or trees; underground utility work, removal and repaving any asphalt surfaces, walkway replacement, etc. The notification letter will include, but not be limited to, the proposed portions of the system to be breached, the purpose of the intrusive activities, a plan for managing and disposing of any solid waste generated during the activity, and a plan to replace the surface cover system in a manner that is at least as protective to human health and the environment as the original surface cover system. The requirements for these Plans will be incorporated into the design documents and will be consistent with local, state, and federal requirements in effect at the time.

4.0 CONSTRUCTION ACTIVITIES AFFECTING COMPOSITE COVER SYSTEM

4.1 General Protocols

The following general protocols will apply in the event that construction work is required which will disturb the Site composite cover system:

- The DOE, DSF, or SCA (Agency) and parties performing the construction work are completely responsible for the safe performance of all invasive work and the structural integrity of excavations and structures that may be affected by the construction work (such as building foundations).

- The hours for operation of construction activities will conform to the New York City Department of Buildings construction code requirements or otherwise according to specific variances issued by that agency.

- Future construction activities at the Site will not interfere with, or otherwise impair or compromise, remedial activities completed in the Final Engineering Report.

- Appropriate soil erosion prevention equipment (e.g., silt fencing, hay bales, etc.) will be installed around the entire perimeter of the construction area.

- Mechanical processing of underlying soil is prohibited.

4.2 Project Oversight

The project manager will designate a remedial engineer or their qualified representative will be assigned to oversee all construction activities that involve the area of the cover system and will be responsible to ensure that all invasive work involving the surface cover material, including work performed by contractors, is performed in compliance with this Soil Management Plan. Certification of the compliance of this work will be stamped and signed and submitted on an annual basis in the Annual Site Management Plan (outlined in more detail in the Site Management Plan). The Remedial Engineer will review all pre-construction plans submitted by contractors for compliance with this Soil Management Plan and will certify compliance in the Annual Site Management Plan. All invasive work performed will be witnessed by the Remedial Engineer or qualified representative.

The Remedial Engineer will be responsible for providing all required Professional Engineer (P.E.) certifications listed in this Soil Management Plan. The Remedial Engineer will certify compliance of all pre-construction plans submitted by contractors, as specified in the Annual Site Management Report (outlined in more detail in the Site Management Plan).

4.3 Health and Safety

A Health and Safety Plan (HASP) will be prepared by contractor performing the construction activities prior to commencement of the work to insure that the Site activities are performed in full compliance with governmental requirements, including Site and worker safety requirements mandated by the Occupational Safety and Health Administration (OSHA). The HASP will identify a Site Safety Coordinator who will oversee the construction activities and insure that the HASP is being properly implemented. Any confined space entry that is required during the construction activities will comply will all OSHA requirements to address the potential for combustible gases. The Site owner and associated parties and the contractor will be completely responsible for the appropriate performance of work according to the HASP and applicable laws.

5.0 MATERIALS MANAGEMENT FOR CONSTRUCTION ACTIVITIES AFFECTING COMPOSITE COVER SYSTEM

The following sections describe the process for materials management during construction activities that will disturb the Site composite cover system.

5.1 Field Screening Activities

Screening of soils and fill will be performed during all invasive construction work (e.g., excavations, underground utility upgrades, landscaping, asphalt or concrete repairs, etc.), that may penetrate the cover system. The field screening activities will include recording of visual and olfactory observations of soil and fill excavated during the construction work. Measurements obtained from a photoionization detector (PID) or flame ionization detector (FID) will also be recorded.

5.2 Excavated Material Testing Requirements

Soil/fill that is excavated during construction work will be further characterized prior to transportation offsite for disposal at a permitted facility. For excavated soil/fill with visual evidence of contamination (i.e., staining or elevated PID/FID measurements), one (1) composite sample will be collected for each 100 cubic yards (CY) of stockpiled soil/fill. For excavated soil/fill that does not exhibit visual evidence of contamination but must be transported for offsite disposal, one (1) composite sample will be collected for each 2,000 CY of stockpiled soil/fill, and a minimum of one (1) composite sample will be collected for volumes less than 2,000 CY.

The composite sample will consist of five grab samples collected within each stockpile. Measurements from a PID will be recorded for each of the five (5) individual locations. If applicable, a grab sample will be collected from the individual location with the highest PID measurement. The composite sample will be analyzed for full Part 375 parameters to determine suitability for on-site reuse. An additional grab sample exhibiting evidence of field contamination will be analyzed for TCL VOCs.

Soil samples will be composited by placing equal portions of soil/fill from each of the five (5) grab sample locations into a pre-cleaned, stainless steel or Pyrex glass mixing bowl. The soil/fill will be thoroughly homogenized using a stainless steel scoop or trowel and transferred to pre-cleaned jars provided by the laboratory. Sample jars will then be labeled and chain-of-custody form will be prepared. Additional characterization sampling for offsite disposal may be required by the disposal facility. The contractor is responsible for performing any required laboratory analysis of the material and satisfying any other requirements of the disposal facility. To potentially reduce offsite disposal requirements/costs, the contractor may choose to characterize each stockpile individually.

If the analytical results suggest that concentrations may exceed the standards for Resource Conservation Recovery Act (RCRA) characteristics, TCLP analysis will be completed. If the analytical results indicate that concentrations exceed the standards for Resource Conservation Recovery Act (RCRA) characteristics, the material will be considered a hazardous waste and must be properly disposed offsite at a permitted disposal facility within 90 days of excavation. If the analytical results indicate that the soil is not a hazardous waste, the material will be properly disposed offsite at a non-hazardous waste facility. Stockpiled soil will not be transported on or offsite until the analytical results are received.

5.3 Offsite Disposal of Materials

5.3.1 Notifications to NYSDEC

All soil/fill excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with all local, state and federal laws. If disposal of soil/fill from the Site is proposed for unregulated disposal, a formal request with an associated plan will be made to NYSDEC's project manager. Unregulated offsite management of materials from the Site will not be performed without formal NYSDEC approval.

Letters will be provided to NYSDEC that fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws. This will include, at minimum: (a) a letter from the Owner to the disposal facility providing all pertinent soil chemistry data and noting that the soil/fill is a contaminated media being removed from a DER remediation site in New York State and (b) a letter from the receiving facility stating that they understand the source and that the material is acceptable under all appropriate permits.

5.3.2 Fill/Soil Disposal Requirements

Non-hazardous fill/soil taken offsite will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Solid & Hazardous Materials (DSHM) in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. These soils may also be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material is prohibited from being redirected to a Part 360-16 Registration Facility. In this case, as dictated by DSHM, special procedures will include, at a minimum, written correspondence to the C/D facility that provides detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it

must not be redirected to onsite or offsite Soil Recycling Facilities. The chemical data for the soil must be attached to the correspondence.

The contractor is responsible for performing any required laboratory analysis of the material and satisfying any other requirements of the disposal facility.

5.3.3 Water Disposal Requirements

Groundwater at the Site is located at approximately 50 - 65 feet below ground surface (bgs) and future construction is not expected to encounter groundwater. However, if dewatering is necessary, dewatered fluids will not be recharged back to the land surface or subsurface of the Site. All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed offsite in accordance with applicable local, state, and federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by the New York City Department of Environmental Protection (NYCDEP).

The contractor is responsible for performing any required laboratory analysis of the material and satisfying any other requirements of the disposal facility.

5.3.4 Hazardous Waste Disposal Requirements

In the unlikely event that hazardous waste is encountered during construction work, the waste will be stored, transported, and disposed in full compliance with applicable local, state, and federal regulations. The contractor is responsible for performing any required laboratory analysis of the material and satisfying any other requirements of the disposal facility.

5.3.5 Disposal Documentation

The Agency and its Remedial Engineer will be responsible for the appropriate disposal of all material removed from the Site during construction, including any excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Appropriately licensed haulers will be used to transport material removed from the Site and will be in full compliance with all applicable local, state and federal laws. A Bill of Lading system and waste disposal manifests will be used to document the disposal of all materials.

5.4 Truck Management

To ensure proper offsite transportation of excavated materials, all trucks leaving the Site will have tight-fitting covers. The trucks will also be washed prior to leaving the Site. Truck wash waters will be

collected and disposed in an appropriate manner. Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during the construction activities.

5.5 Stockpile Management

Stockpiles will be kept covered at all times with appropriately anchored tarps during the construction activities. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced. Silt fencing will be installed around soil stockpiles to prevent rainwater runoff from mixing with contaminated material. Hay bales will also be used as necessary near catch basins, surface waters and other discharge points to prevent runoff impact.

5.6 Odor and Dust Controls

Odor control methods will be implemented during the construction activities to control emissions of nuisance odors from excavations or stockpiles. If nuisance odors are identified, construction activities will cease and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. The NYSDEC and the New York State Department of Health (NYSDOH) will be notified of all odor events and of all other complaints about the construction work. Implementation of all odor controls, including cessation of work, will be the responsibility of the Remedial Engineer who is responsible for certifying the compliance of the construction activities.

All necessary means will be employed to control odors and eliminate associated nuisances onsite and offsite. Odor control methods to be used including the following: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; (c) use of foams to cover exposed odorous soils; (d) use of chemical odorants in spray or misting systems; and, (e) monitoring of odors in surrounding neighborhoods. If these methods are not successful, enclosures will be erected around work areas to control odors.

In addition to controlling odors, dust suppression control methods will also be implemented during the construction activities. Dust suppression control measures may include misting of the material during the excavation work.

5.7 Restrictions on Reuse of Onsite Materials

Material that has been tested and found to contain levels of organic compounds and inorganic analytes that do not exceed Part 375-6.3 Unrestricted Use meeting the gradation requirements described in the SMP may be reused on the Site, and is referred to as “Environmentally Clean Fill and Backfill.” Environmentally Clean Fill shall contain no particles exceeding four inches in the largest diameter. No more than 30 percent of the material shall be retained on a ¾ inch sieve. The material passing the ¾ inch

sieve shall contain, by weight, no more than 40 percent passing the No. 100 sieve and 12 percent passing the No. 200 sieve.

The following restriction on reuse of onsite materials will apply:

- Cleaning or processing onsite of residual contaminated concrete is prohibited.
- Organic matter (wood, roots, stumps, etc.) or other solid waste derived during invasive activities is prohibited for reuse onsite.
- Contaminated onsite material, removed from beneath the installed composite cover system will not be reused within a cover soil layer, within landscaping berms or as backfill for subsurface utility lines.
- Contaminated onsite material removed during construction activities cannot be re-used.
- Concrete pavement, asphalt pavement and/or recessed safety surfaces that are removed during construction activities cannot be re-used.

5.8 Backfilling Requirements

Subgrade material used to backfill excavations or placed to increase Site grades or elevation shall meet the following criteria:

- Any offsite fill material brought to the Site for filling and grading purposes shall be from an acceptable borrow source free of industrial and/or other potential sources of chemical or petroleum contamination. All imported soils will meet the definition of Environmentally Clean Fill as specified in Section 5.7 of this SoMP.
- Offsite soils intended for use as Site backfill cannot otherwise be defined as solid waste in accordance with 6 NYCRR Part 360-1.2(a).
- If the contractor designates a source as “virgin” soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development, or agricultural use.
- Virgin soils will be subject to collection of one (1) representative grab sample per source. The sample will be analyzed for TCL VOCs; TCL SVOCs; TCL pesticides and PCBs; arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver and cyanide. The soil will be

acceptable for use as backfill provided that all parameters meet the NYSDEC Part 375, Restricted Use Soil Cleanup Objectives for Residential Use.

Non-virgin soils will be tested via collection of one (1) grab sample per 500 CY of material from each source area. If more than 1,000 CY of soil are borrowed from a given offsite non-virgin soil source area and both samples of the first 1,000 CY meet the NYSDEC Part 375 standards, the sample collection frequency will be reduced to one (1) grab sample for every 2,500 CY of additional soils from the same source, up to 5,000 CY. For borrow sources greater than 5,000 CY, sampling frequency may be reduced to one (1) sample per 5,000 CY, provided all earlier samples meet the environmentally clean fill requirements listed in Section 2.3.2.6 of the SMP.

6.0 CONTINGENCY PLAN

This section details the protocols to follow in the event that previously unidentified contaminants and/or material are discovered during onsite construction activities

6.1 Identification of Unknown Contaminated Media or USTs

Identification of unknown or unexpected contaminated media identified by field screening activities during invasive Site work will be promptly communicated by telephone to the NYSDEC project manager. If previously unidentified underground storage tanks or contaminant sources are identified, sampling will be performed on product, sediment and surrounding soils, etc. These samples will be submitted for laboratory analysis for full Part 375 parameters. These analytical parameters will not be modified without prior approval from the NYSDEC.

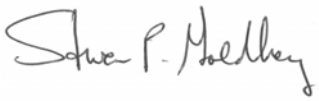
In the event that any USTs are encountered during soil disturbance, UST closures will, at a minimum, conform to DER-10.

7.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

Shaw has developed a Soil Management Plan for the Metropolitan Avenue Site located at 87-01 69th Avenue and 92-34 Metropolitan Avenue in Forest Hills, Queens, New York based on the June 27, 2002 Voluntary Cleanup Program Agreement #V-00500-2 entered into between the NYCSCA and the NYSDEC.

Shaw Environmental & Infrastructure, Inc.

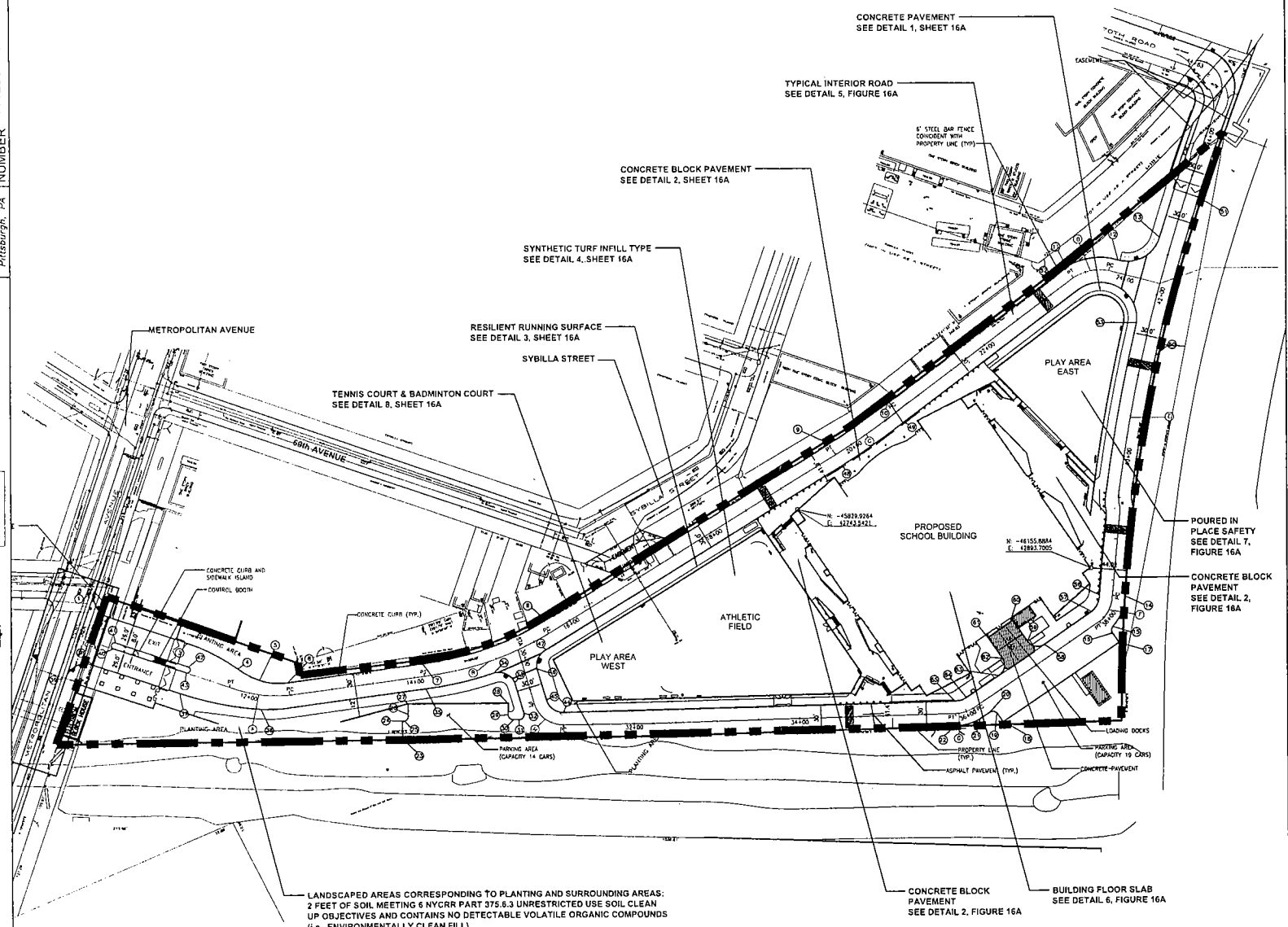
Amy E. Fontana
Senior Environmental Scientist



Steven Goldberg, Ph.D., CPG
Senior Project Manager

FIGURES

OFFICE Pittsburgh, PA | DRAWING NUMBER 111256-FIG1



PROPERTY BOUNDARY

SCALE
0 60 120 180 FEET

REFERENCE

BASEMAP FROM SHEET C105 URBAHN ARCHITECTS
40 WEST 37th STREET
NEW YORK, NEW YORK 10018

Shaw Shaw Environmental & Infrastructure, Inc.

DESIGNED BY: --	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
DRAWN BY: B. Snyder	FIGURE 1 PRINCIPAL SITE COVERS
CHECKED BY: --	METROPOLITAN AVENUE SCHOOL SITE 87-01 69th STREET 92-34 METROPOLITAN AVENUE FOREST HILLS, NY 11374

APPROVED BY:	DATE:	SCALE:	DRAWING NO.	SHEET NO.
--	7/25/07	AS SHOWN	111256-FIG1	--

File: N:\Civil Projects\NYCSCA - Metro Ave SWP 2007\Figure 1 for SWPPP.dwg
Plot Date/Time: Aug 22, 2007 - 4:32pm
Plotted By: smyiontura

APPENDIX G

SPECIFICATIONS AND DRAWINGS FOR VAPOR BARRIER

SECTION 02220
GAS VAPOR BARRIER (FLUID APPLIED)

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Install a fluid applied gas vapor barrier, LIQUID BOOT® or Authority approved equivalent, under concrete slab and for wall applications as indicated, specified and required in the Contract Documents and Drawings (ENV-1, ENV-2 and ENV-7).

This Section specifically references products manufactured by LBI Technologies, Inc. (LBI). Another Authority approved product may be substituted provided it meets the material properties, test and application procedures defined in Part 2 and Part 3 of this Section.

1.02 RELATED SECTIONS

A. Environmental Site Assessment Reports . . . . . .Section 02010

B. Storage, Handling, Transportation and Disposal of Non-Hazardous Industrial Waste and/or Hazardous Waste.....Section 02091

C. Site Preparation . . . . . Section 02100

D. Earthwork . . . . . .Sections 02200 & 02200A

E. Sub-Slab Depressurization System. . . . .Section 02221

F. Coordination. . . . . .Section 02222

G. Trench Drains . . . . . .Section 02721

H. Storm Drainage Systems . . . . . Section 02723

I. Cast-in-Place Concrete. . . . . Section 03300

J. Perimeter Foundation Insulation. . . . . Section 07211

K. Miscellaneous Building Insulation. . . . Section 07212

L. Sub-Slab Depressurization System

Accessories.....Section 15880

M. Installation of Piping and Conduits. . . . Division 15 & Division 16

1.03 STANDARDS AND REGULATIONS

A. American Society of Testing and Materials (ASTM) Standards.

ASTM D882 - Tensile Properties of Thin Plastic Sheeting.

ASTM D1709 - Impact Resistance of Plastic Film by the Free-Falling Dart Method.

ASTM D2582 - Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.

ASTM D3776 - Mass per Unit Area (Weight) of Woven Fabric.

ASTM D4833 - Index Puncture Resistance of Geotextiles, Geomembranes and Related Products.

ASTM E84 - Surface Burning Characteristics of Building Materials.

ASTM E96 - Water Vapor Transmission of Materials.

ASTM E1643 - Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

ASTM E1745 - Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

B. National Fire Protection Association, latest editions.

701 - Fire Tests for Flame-Resistant Textiles and Films.

1.04 RESTRICTIONS AND QUALITY CONTROL

A. Preinstallation Meeting: Convene a preinstallation meeting prior to the start of gas vapor barrier installation to assure proper substrate and installation conditions. Require attendance of parties directly affecting work of this Section, including Contractor, Architect/Engineer, installer and special inspector (if any). Review installation, protection, and coordination

with other work.

B. General Performance Requirements: It is required that the liner be permanently vapor tight and not deteriorate for a period of 50 years after the date of acceptance by the Authority. Failure to comply with this requirement will be considered a failure of materials and workmanship. The gas vapor barrier shall pass all acceptance tests outlined in Part 3.04 of this Section.

C. Installer: Gas vapor barrier installer shall be trained and approved by gas vapor barrier manufacturer.

The following is a list of some approved installers:

Debrino Caulking
Contact: Al Poole
Phone: 518-732-7234

EAI
Contact: Heather Martin
Phone: 201-395-0010, ext. 257

Edgeboro International
Contact: Jack Whitman, Jr.
Phone: 732-227-1356

RESTOR
Contact: Frank Morisco
Phone: 631-385-8400

Terrafix Environmental
Contact: Troy Shaw
Phone: 416-674-0363

D. Inspection: Contractor shall provide a licensed engineer with experience and qualifications to approve the work, independent of the installer, to conduct the inspection of the gas vapor barrier installation. Qualifications of this licensed engineer shall be approved by the Authority prior to the inspection. Approval of the work by an engineer does not relieve the manufacturer and/or the installer of their responsibility to produce and install the vapor protection system to meet the performance requirements as stated above. The inspection shall be performed by a licensed engineer with experience and qualifications to approve the work; independent of the installer. This is not the Authority's responsibility.

E. The installer shall perform a smoke test in accordance with Part 3.04C of this specification and shall document the successful completion of this test.

1.05 SUBMITTALS

A. All submittals shall be received by the Authority for review at least 14 days prior to the commencement of work.

B. Product Data: Submit manufacturer's product data, including installation instructions and termination shop drawings.

C. Samples: Submit representative samples of the following for approval:

1. Gas vapor barrier membrane material.
2. Protection Board and/or Protection Mat.
3. Geotextiles.

D. Material Test Reports: Indicate and interpret test results for compliance of gas vapor barrier with requirements indicated, as applicable.

E. Certification: Submit manufacturer's Certification of Compliance indicating that materials delivered and used in the work are in strict compliance with specified requirements, see Article 2.01 in this Section.

F. Documentation of successful smoke test completion as required in Part 3.04C of this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in original unbroken packages bearing manufacturer's label showing brand, weight, volume, and batch number. Deliver materials to the site only after the Authority has reviewed and approved the required submittals.

B. Store materials at site in strict compliance with manufacturer's instructions. Store materials on-site in a clean, dry area. Do not allow materials to freeze in containers.

C. Protect materials during handling and installation to prevent damage. Replace any damaged materials at no cost to the Authority unless the damaged material can be repaired per the manufacturer's requirements and to the

satisfaction of the Authority and such that foundation vapor protection is not compromised.

1.07 PROJECT/SITE CONDITIONS

A. Protect all adjacent areas not to receive gas vapor barrier. Where necessary, apply masking to prevent staining of surfaces to remain exposed wherever membrane abuts to other finish surfaces.

B. Perform work only when existing and forecasted weather conditions are within manufacturer's recommendations for the material and product used.

C. Minimum clearance required for application of product:
   1. 90 degree spray wand - 2 feet.
   2. Conventional spray wand - 4 feet.

D. Ambient temperature shall be within manufacturer's specifications. For winter conditions the Contractor shall use space heaters and necessary cover (i.e., visqueen) to bring the ambient temperature to +45°F until the protection course and structural slab rebar has been placed.

E. The Contractor shall coordinate with all trades involved, the scheduling of excavation and backfill to ensure that all necessary components of work, due to be buried, are installed thus avoiding duplication of excavation work unless otherwise shown on the Contract Drawings or noted in other sections of the Contract Documents. No other work should be performed in areas above an installed gas vapor barrier section until the liner protection geotextile has been installed and the vapor barrier installer approves it. The Contractor shall verify there are no interferences with other existing or proposed subsurface systems. Gas permeable aggregate backfill must be rolled flat and non-angular.

F. All plumbing, electrical, mechanical and structural items to be under or passing through the gas vapor barrier shall be positively secured in their proper positions and appropriately protected prior to membrane application.

G. Gas vapor barrier shall be installed before placement of reinforcing steel. When not possible, all exposed reinforcing steel shall be masked by General Contractor prior to membrane application.

H. Expansion joints must be filled with a conventional waterproof expansion joint material.

I. Surface preparation shall be per manufacturer's specification.

1.08 EXTENDED WARRANTY

A. Submit a warranty, signed by the gas vapor barrier installer and manufacturer of fluid applied gas vapor barrier (Liquid Boot or Authority approved equal) and geotextile materials, agreeing to replace/repair defective materials and workmanship, including significant leakage of vapors within warranty period. The warranty period is 50 years after date of acceptance by the Authority.

Submit a separate warranty, signed by the installer of the gas vapor barrier and geotextile materials, agreeing to replace/repair defective materials and workmanship, including significant leakage of vapor within the warranty period. The installer's warranty period is 5 years after date of acceptance by the Authority. For the Authority to accept the 5-year warranty from the installer, the following shall be performed:

1. The installer shall comply with the Contract Documents (Specification Sections 02220 and 02221, and Drawings ENV-1 and ENV-2) requirements for installation.

2. NYCSCA Project Management, or a Third Party designated by the Authority shall perform inspections to verify that the gas vapor barrier was installed to Specification requirements.

3. The requirements of Article 3.04 of this Section shall be met, including, but not limited to, "Once the membrane has passed the smoke test inspection, the successful completion shall be documented and signed off by a qualified inspector as determined by the Engineer, the General Contractor, or the Authority."

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fluid applied gas vapor barrier system - LIQUID BOOT® or approved equivalent; a single course, high build, polymer

modified asphaltic emulsion. Water borne and spray applied at ambient temperatures. A minimum thickness of 60 dry mils is required, unless specified otherwise. Non-toxic and odorless. LIQUID BOOT® Trowel Grade has similar properties with greater viscosity and is trowel applied. Manufactured by LBI Technologies, Inc., Santa Ana, CA (714) 384-0111.

B. Gas vapor barrier physical properties:

GAS VAPOR MEMBRANE	TEST METHOD	VALUE
Hydrogen Sulfide Gas Permeability	ASTM D1434	None Detected
Benzene, Toluene, Ethylene, Xylene, Gasoline, Hexane, Perchloroethylene, Trichloroethylene, Vinyl Chloride	ASTM D543 (tested at 20,000 ppm)	Less than 1% weight change
Sodium Sulfate (2% water solution)	ASTM D543, D412, D1434	Less than 1% weight change
Acid Exposure (10% H_2SO_4 for 90 days)	ASTM D543	Less than 1% weight change
Radon Permeability	Tested by US Dept. of Energy	Zero permeability to Radon (222Rn)
Chromate Exposure (10% Chromium^{6+} salt for 31 days)	ASTM E96	Less than 1% weight change
Air Infiltration	ASTM E283-91	0 cfm/sq. ft.
Bonded Seam Strength Tests	ASTM D6392	Passed
Micro Organism Resistance (Soil Burial) average weight change, average tensile strength change, average tensile stress change, average elongation change, bonded seams, methane permeability	ASTM D4068-88	Passed
Methane Permeability	ASTM 1434-82	Passed
Oil Resistance Test average weight change, average tensile strength change, average tensile stress change, average elongation change, bonded seams, methane permeability	ASTM D543-87	Passed
Heat Aging average tensile strength change, average tensile stress change, average elongation change, bonded seams	ASTM D4068-88	Passed
Dead Load Seam Strength	City of Los Angeles	Passed
Environmental Stress-Cracking	ASTM D1693-78	Passed
PCE Diffusion Coefficient	Tested at 6,000 mg/m^3	2.74 x 10^{-14}m^2/sec
TCE Diffusion Coefficient	Tested at 20,000 mg/m^3	8.04 x 10^{-14}m^2/sec
WATERPROOFING	**TEST METHOD**	**VALUE**
Soil Burial	ASTM E154-88	Passed
Water Penetration Rate	ASTM D2434	<7.75 x 10^{-9} cm/sec
Water Vapor Permeability	ASTM E96	0.24 perms
Water Vapor Transmission	ASTM E96	0.10 grains/h-ft^2

POTABLE WATER	TEST METHOD	VALUE
Toxicity Test	22 CCR 66696	Passed. CCR Bioassay—Flathead Minnow
Potable Water Containment	ANSI/NSF 61	NSF Certified for tanks >300,000 gallons

GENERAL INFORMATION	TEST METHOD	VALUE
Coefficient of Friction (with geotextile both sides)	ASTM D5321	0.72
Cold Bend Test	ASTM D146	Passed. No cracking at -25°F
Freeze-Thaw Resistance (100 Cycles)	ASTM A742	Meets criteria. No spalling or disbondment
Accelerated Weathering and Ultraviolet Exposure	ASTM D822	No adverse effect after 500 hours
Hydrostatic Head Resistance	ASTM D751	Tested to 138 feet or 60 p.s.i
Elongation	ASTM D412	1,332% without reinforcement, 90% recovery
Elongation with 8oz. non-woven geotextile both sides	ASTM D751	100% (same as geotextile tested separately)
Tensile Strength	ASTM D412	58 p.s.i. without reinforcement
Tensile Strength with 8oz. non-woven geotextile both sides	ASTM D751	196 p.s.i. (same as geotextile tested separately)
Tensile Bond Strength to Concrete	ASTM D413	2,556 lbs/ft^2 uplift force
Puncture Resistance with 8oz. non-woven geotextile both sides	ASTM D4833	286 lbs. (travel of probe = 0.756 inches) (same as geotextile tested separately)
Flame Spread	ASTM E108	Class A with top coat (comparable to UL790)
Electric Volume Resistivity	ASTM D257	1.91 x 10^{10} ohms-cm

C. Protection - On vertical surfaces use: LIQUID BOOT® UltraShield P-100 or other protections as approved by the manufacturer, project architect or engineer.

On horizontal surfaces use: LIQUID BOOT® UltraShield G-1000 above the 60 mil LIQUID BOOT® gas vapor barrier or other protections as approved by the manufacturer, project architect or engineer.

Due to the diverse jobsite conditions, all protection materials must be approved by the membrane manufacturer, including the use of the LIQUID BOOT® UltraShield products.

D. Geotextile - LIQUID BOOT® UltraGeo (also known as Base Fabric) T-60 non-woven geotextile as a cushion layer on gas permeable aggregate, unless otherwise specified and

approved by membrane manufacturer. The heat-rolled side shall be used as the application surface.

E. Adhesive system for LIQUID BOOT® UltraShield: Use LIQUID BOOT® UltraGrip.

F. Cold Joints, Cracks, Form Tie Holes: Covered with Hardcast CRT 1602 Tape 3" wide.

G. General: Provide additional installation accessories as necessary. Ensure accessories are from same manufacturer as gas vapor barrier.

PART 3 - EXECUTION

3.01 EXAMINATION

All surfaces to receive gas vapor barrier shall be inspected and approved by the Authority and installer prior to commencing work.

3.02 SURFACE PREPARATION

Provide 24-inch minimum clearance out from surfaces to receive the gas vapor barrier. The application surface shall be prepared and provided to the applicator in accordance with manufacturer's specifications listed below:

A. Concrete/Shotcrete/Masonry

Concrete surfaces shall be light broom finish or smoother, free of any dirt, debris, loose material, release agents or curing compounds. Fill all voids more than 1/4 inch deep and 1/4 inch wide. Masonry joints, cold joints, and form joints shall be struck smooth.

All penetrations shall be prepared in accordance with manufacturer's specifications. Provide a 3/4 inch minimum cant of LIQUID BOOT®, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120° or less. **Allow to cure overnight before the application of LIQUID BOOT®.**

All cracks or cold joints greater than 1/16 inch must be completely grouted with non-shrink grout as approved by engineer.

Install Hardcast reinforcing tape over all cold joints,

cracks and form tie holes (after holes and cracks are grouted).

B. Dirt & Gravel

The subgrade shall be constructed on top of a single layer of non-woven geotextile. The subgrade shall consist of an 18-inch-thick layer of gas permeable aggregate, as defined in Section 02200 2.01G, compacted to provide a level working surface. The subgrade shall be moisture conditioned and compacted to a minimum relative compaction of 90 percent or as specified by civil/geotechnical engineer. The surfaces to be lined shall be free of all other rocks, stones, sticks, roots, sharp objects, or construction debris of any kind. No standing water, excessive moisture or frozen ground shall be allowed. (NOTE: Aggregate sub-bases shall be rolled flat). All penetrations shall be prepared in accordance with manufacturer's specifications. All form stakes that penetrate the membrane shall be of rebar which shall be bent over and left in the slab. The Authority shall approve the subgrade on which the liner is to be installed prior to commencing work.

Trenches shall be cut oversize to accommodate gas vapor barrier membrane and protection course with perpendicular to sloped sides and maximum obtainable compaction. Adjoining grade shall be finish graded and compacted. Excavated walls shall be vertical or sloped back, free of roots and protruding rocks. Specific sub-grade preparation shall be designed by a qualified civil or geotechnical engineer.

If organic materials with potential for growth (i.e., seeds or grasses) exist within the subbase, spray apply soil sterilant at the sterilant manufacturer's recommended rate.

3.03 INSTALLATION

A. INSTALLATION ON CONCRETE/SHOTCRETE/MASONRY
Follow the procedures below carefully.

1. Refer to Part 3.03D, "Sealing Around Penetrations", for procedures to seal around penetrations. Details are provided on Contract Drawing ENV-2.

2. Provide a 3/4 inch minimum cant of LIQUID BOOT®, or other suitable material as approved by manufacturer, at all horizontal to vertical

transitions and other inside corners of 120° or less. **Allow to cure overnight before the application of LIQUID BOOT®.**

3. Delineate a test area **on site** with a minimum dimension of 10 feet by 10 feet (3m by 3m). Apply LIQUID BOOT® to a thickness of 60 mils and let it cure for **24 hours.** Observe for blisters. If minor or no blistering occurs, proceed to the next step. (See note regarding blisters). If significant blistering does occur, apply a thin (10 mil) tack coat of LIQUID BOOT® "A" side without catalyst to the entire concrete surface and allow to cure before proceeding. (See also information regarding blister repair).

4. Spray apply LIQUID BOOT® to a 60 mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.

5. Do not penetrate membrane. Keep membrane free of dirt and debris and traffic until a protective cover is in place. **It is the responsibility of the General Contractor to insure that the membrane and the protection system are not penetrated.**

6. After membrane has cured and checked for proper thickness and flaws, install protection material pursuant to manufacturer's instructions.

NOTE: All testing or inspection to be performed prior to placing protection course.

7. NON-HORIZONTAL SURFACES: Spray on non-horizontal surfaces should begin at the bottom and work towards the top. This method allows the product to adhere to the surface before hitting catalyst runoff.

NOTE: Due to the nature of concrete as a substrate, it is normal for some blistering to occur. This is caused by either concrete's tendency to off-gas or water that is temporarily trapped between the concrete and the membrane. With time and the applied pressure of backfill or over-slab, blisters will absorb into the concrete without detriment to the membrane.

A small number of blister heads should be sampled and checked for proper membrane thickness. If the samples have the minimum required membrane thickness, then the remaining blisters should not be punctured or cut. If the samples have less than the minimum required membrane thickness, then the area can either be resprayed to obtain the proper thickness, or the blisters can be cut out and the area resprayed or patched with LIQUID BOOT® Trowel Grade.

B. INSTALLATION ON DIRT SURFACES AND MUDSLABS

1. Roll out geotextile on sub-grade with the heat-rolled side facing up. Overlap seams a minimum of six inches (6"). Lay geotextile tight at all inside corners. Apply a thin (10 mil) tack coat of LIQUID BOOT® "A" side without catalyst within the seam overlap.

   Line trenches with geotextile extending at least six inches (6") onto adjoining sub-grade if slab and footings are to be sprayed separately. Overlap seams a minimum of six inches (6"). Lay geotextile tight at all inside corners. Apply a thin (10 mil) tack coat of LIQUID BOOT® "A" side without catalyst within the seam overlap.

2. Minimize the use of nails to secure the geotextile to the dirt subgrade. Remove all nails before spraying membrane, if possible. Nails that cannot be removed from the dirt subgrade are to be patched with geotextile or Hardcast reinforcing tape overlapping the nail head by a minimum of two inches (2"). Apply a thin tack coat of LIQUID BOOT® under the geotextile patch, when patching with geotextile.

3. Refer to Part 3.03 D, "Sealing Around Penetrations", for procedures to seal around penetrations; details are provided on Contract Drawing ENV-2.

4. Spray apply LIQUID BOOT® onto geotextile to an 60 mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.

5. Do not penetrate membrane. Keep membrane free of dirt, debris and traffic until a protective cover is in place. **It is the responsibility of the General Contractor to insure that the membrane and the protection system are not penetrated.**

6. After membrane has cured and checked for proper thickness and flaws, install protection material pursuant to manufacturer's instructions.

NOTE: All testing or inspection to be performed prior to placing protection course.

C. BLIND SIDE INSTALLATION (If Necessary)

1. Attach subsurface drain mat or, securely nail 8 oz. non-woven geotextile over lagging and soldier piles keeping geotextile tight to lagging wall. Overlap seams a minimum of six inches (6").

2. Roll out specified geotextile vertically with the heat-rolled side facing out and staple to lagging using 3/8 long staples 12" on center. Overlap seams a minimum of six inches (6"). Spray LIQUID BOOT® within the seam overlap to a thickness of 60 mils minimum. Do not staple top layer of geotextile at overlap.

3. Refer to Part 3.03D, "Sealing Around Penetrations", for procedures to seal around penetrations; details are provided on Contract Drawing ENV-2.

4. Provide a 3/4 inch minimum cant of LIQUID BOOT®, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120° or less. **Allow to cure overnight before the application of LIQUID BOOT® membrane.**

5. Spray apply LIQUID BOOT® to a minimum thickness of 60 mils (100 mils if installing shotcrete walls). Remove any standing water.

6. Do not penetrate membrane. Keep membrane free of dirt and debris until concrete is in place. **It is the responsibility of the General Contractor to insure that the membrane and the protection system are not penetrated.**

D. SEALING AROUND PENETRATIONS

1. Option 1

a. Clean all penetrations. All metal penetrations shall be sanded clean with emery cloth.

b. For applications requiring geotextile, roll out geotextile on sub-grade with the heat-rolled side facing up, overlapping seams a minimum of six inches (6"). Cut the geotextile around penetrations so that it lays flat on the sub-grade. Lay geotextile tight at all inside corners. Apply a thin (10 mil) tack coat of LIQUID BOOT® "A" side without catalyst within the seam overlap.

c. At the base of penetration install a minimum 3/4 inch thick membrane cant of LIQUID BOOT®, or other suitable material as approved by manufacturer. Extend the membrane at a 60 mil thickness three inches (3") around the base of penetration and up the penetration a minimum of three inches (3"). **Allow to cure overnight before the application of LIQUID BOOT® membrane (Refer to Typical LIQUID BOOT® Penetration Detail at Slab on Contract Drawing ENV-2).**

d. Spray apply LIQUID BOOT® to a 60 mils minimum dry thickness around the penetration, completely encapsulating the collar assembly and to a height of one and one half inches (1 1/2") minimum above the membrane as described in step "c" above. Spray apply LIQUID BOOT® to surrounding areas as specified for the particular application **(Refer to Typical LIQUID BOOT® Penetration Detail at Slab on Contract Drawing ENV-2).**

e. Allow LIQUID BOOT® to cure completely before proceeding to step "f".

f. Wrap penetration with polypropylene cable tie at a point two inches (2") above the base of the penetration. Tighten the cable tie firmly so as to squeeze, but not cut, the cured membrane collar.

2. Option 2 (For Gas Vapor Membrane Only)

a. Clean all penetrations. All metal penetrations shall be sanded clean with emery cloth.

b. For applications requiring geotextile, roll out geotextile on sub-grade with the heat-rolled side facing up, overlapping seams a minimum of six inches (6"). Cut the geotextile around penetrations so that it lays flat on the sub-grade. Lay geotextile tight at all inside corners. Apply a thin (10 mil) tack coat of LIQUID BOOT® "A" side without catalyst within the seam overlap.

c. Spray apply LIQUID BOOT® to surrounding areas as specified for the particular application to an 60 mil minimum dry thickness. At the base of penetration install a minimum 3/4 inch thick membrane cant of LIQUID BOOT®, or other suitable material as approved by manufacturer. Extend the membrane at 60 mil thickness up the penetration a minimum of three inches (3"). **Allow to cure overnight before proceeding to "d" (Refer to Typical LIQUID BOOT® Penetration Detail at Slab on Contract Drawing ENV-2).**

d. Spray apply LIQUID BOOT® the membrane at a 60 mil thickness three inches (3") around the base of penetration and up the penetration, completely encapsulating the collar assembly, to a height of one and one half inches (1 1/2") minimum above the membrane as described in step "c" above. **(Refer to Typical LIQUID BOOT® Penetration Detail at Slab on Contract Drawing ENV-2)**

e. Allow LIQUID BOOT® to cure completely before proceeding to step "f".

f. Wrap penetration with polypropylene cable tie at a point two inches (2") above the base of the penetration. Tighten the cable tie firmly so as to squeeze, but not cut, the cured membrane collar.

3.04 FIELD QUALITY CONTROL

Field Quality Control is a very important part of all LIQUID BOOT® applications. Applicators should check their own work for coverage, thickness, and all around good workmanship before calling for inspections.

The membrane must be cured at least overnight before inspecting for dry-thickness, holes, shadow shrinkage, and any other membrane damage. If water testing is to be performed, allow the membrane to cure at least 72 hours prior to the water test.

When thickness or integrity is in question the membrane should be tested in the proper manner as described below. However, over-sampling defeats the intent of inspections. Inspectors should always use visual and tactile measurement to guide them. Areas suspected of being too thin to the touch should be measured with the gauges to determine the exact thickness.

A. ON CONCRETE/SHOTCRETE/MASONRY AND OTHER HARD SURFACES

1. Membrane may be checked for proper thickness with a blunt-nose depth gauge, taking one reading every 500 square feet. Record the readings. Mark the test area for repair, if necessary.

2. If necessary, test areas are to be patched over with LIQUID BOOT® to a 60 mils minimum dry thickness, extending a minimum of one inch (1") beyond the test perimeter.

B. ON DIRT AND OTHER SOFT SUBSTRATES

1. Coupon samples shall be cut from the membrane and geotextile sandwich to a maximum area of 2 square inches. Measure the thickness with a mil-reading caliper, per 500 square feet. Deduct the plain geotextile thickness to determine the thickness of LIQUID BOOT® membrane. Mark the test area for repair. Readings shall be recorded on the Coupon Sampling and Smoke Testing Log by qualified inspector.

2. Voids left by sampling are to be patched with geotextile overlapping the void by a minimum of two inches (2"). Apply a thin tack coat of LIQUID BOOT® under the geotextile patch. Then spray or trowel apply LIQUID BOOT® to a 60 mils minimum dry thickness, extending at least three inches (3") beyond geotextile patch.

C. SMOKE TESTING FOR HOLES

All Gas Vapor Membranes shall be Smoke Tested in accordance with the following protocol:

1. The gas membrane shall be visually inspected. Any apparent deficiencies and/or installation problems shall be corrected prior to Smoke Testing.

2. Smoke Testing of the LIQUID BOOT® membrane to be conducted by Approved LIQUID BOOT® Installer and observed by qualified inspector as designated.

3. The date, time, testing reference area, temperature, wind speed/direction, and cloud cover shall be recorded on the Smoke Testing Record. The ambient air temperature at the time of testing should be in excess of 45° F and the wind speed at ground level should be 15 mph or less. (Note: visual identification of leaks becomes more difficult with increasing wind speed.)

4. Delineate a smoke testing area of 2,000 - 5,000 ft^2 maximum). Assemble and situate smoke testing system to inject smoke beneath membrane. Only inert, non-toxic smoke is to be utilized for membrane Smoke Test.

5. Designate testing control areas by cutting openings in an "X" pattern (min. 4" X 4") in the membrane at selected locations. Mark testing control areas for identification prior to conducting the smoke test.

6. Activate smoke generator / blower system (nominal 150 - 950 cfm). Apply sufficient pressure as to ensure that smoke will permeate the designated testing area. For verification, ensure that smoke is leaking through testing control areas.

7. Pump smoke beneath the membrane (Min. 1 - 2 minutes). Observe for leaks in the membrane. Reduce pressure / flow rate if excessive lifting of the membrane occurs.

8. Thoroughly inspect entire membrane surface within area delineated for testing. Use marking device as approved by LBI Technologies Inc. or approved equal to mark / label any leak locations. Mark / label leak locations on floor plan and corresponding testing reference area.

9. Repair leak locations marked in Step #8 by spraying LIQUID BOOT® or using trowel grade LIQUID BOOT®.

10. Repeat step #'s 7 and 8, as necessary to confirm integrity of the membrane.

11. Readings shall be recorded on the Coupon Sampling and Smoke Testing Log by qualified inspector. Once the membrane has passed the smoke test inspection, the successful completion should be documented and signed off by a qualified inspector as delineated by the Engineer, General Contractor, or the Authority.

3.05 PROTECTION

A. The 60 mil gas vapor barrier shall be protected per manufacturer's recommendations to prevent disturbance, damage or deterioration by work of other trades or environmental conditions. Protect gas vapor barrier from damage during installation of reinforcing steel and utilities and during placement of concrete slab or granular materials. Sharp angular backfill materials shall not be placed immediately against the LIQUID BOOT ® barrier.

B. The Authority will visually inspect the condition of the 60 mil gas vapor barrier immediately prior to placing the overlying geotextile protective layer or below-grade wall backfill. All damage to the installed gas vapor barrier shall be repaired at the Contractor's expense prior to placement of concrete or backfill.

C. Ensure there is no moisture entrapment by gas vapor barrier due to rainfall or ground water intrusion.

D. Protect reinforced gas vapor barrier from damage until covered by finish wall.

E. Immediately repair damaged gas vapor barrier in accordance with manufacturer's instructions.

3.06 WARRANTY

A. The manufacturer/installer shall provide a written warranty to the Authority as specified in Part 1.08 of this Section.

END OF SECTION

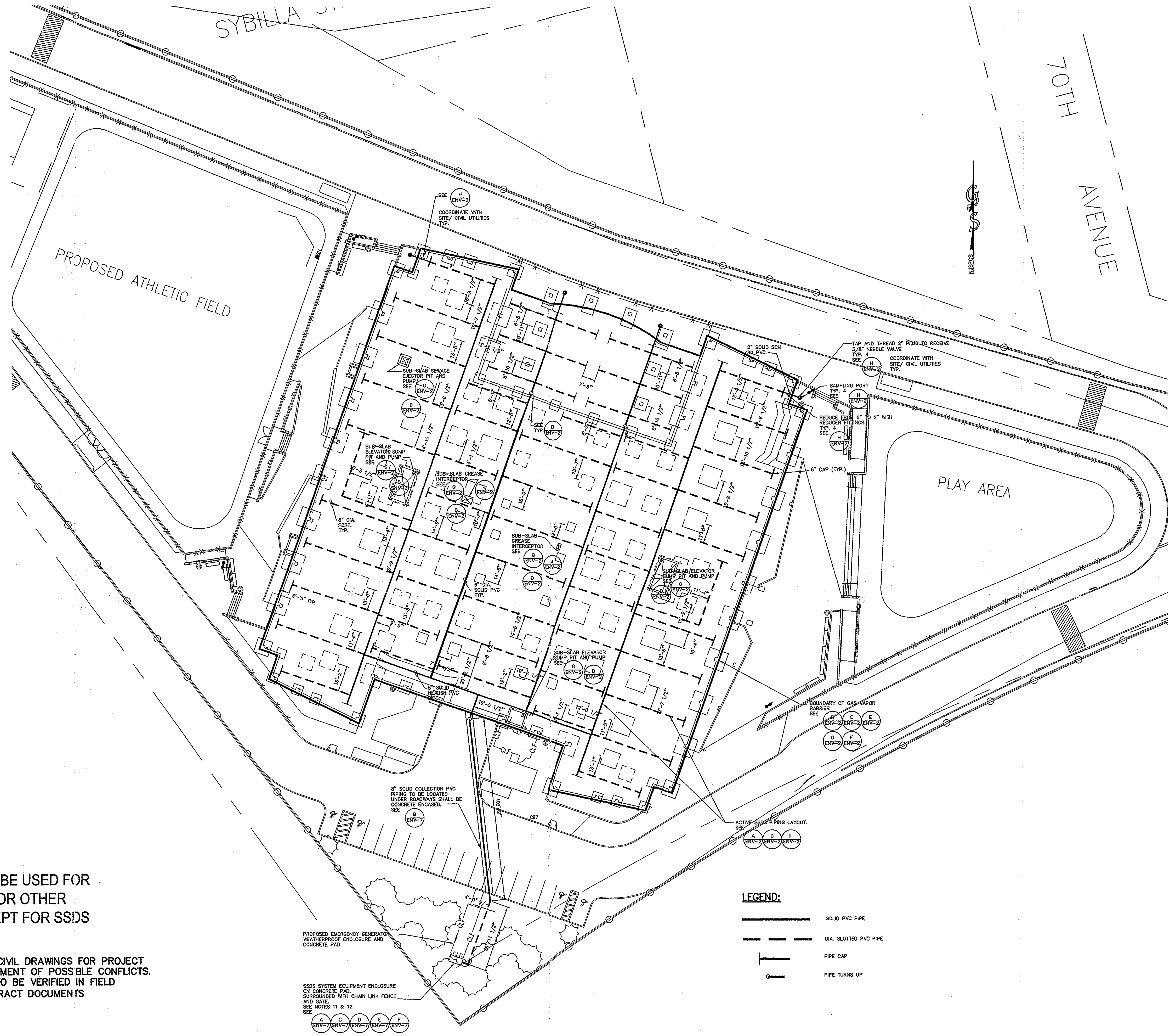
LIST OF SUBMITTALS

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Product Data:	_____	_____
1. Gas Vapor Barrier Material 2. Protection Board/Mat 3. Geotextiles		
Shop Drawings:	_____	_____
Samples:	_____	_____
Design Data:	_____	_____
1. Barrier Composition		
Test Reports:	_____	_____
Daily Logs:	_____	_____
Certification:	_____	_____
Warranty:	_____	_____
Inspection Certification Reports (Coupon Sampling And Smoke Testing Log:	_____	_____

* * *

NOTES (ENV-1 & ENV-2):

1. THE SURFACES TO BE LINED SHALL BE FREE OF ALL ROCKS, STONES, STICKS, ROOTS, SHARP OBJECTS, OR CONSTRUCTION DEBRIS OF ANY KIND. NO STANDING WATER, EXCESSIVE MOISTURE OR FROZEN GROUND SHALL BE ALLOWED.
2. AGGREGATE BACKFILL MUST BE ROLLED FLAT AND NON-ANGULAR.
3. UNDERSLAB GAS VAPOR COLLECTION PIPING SHALL BE CONSTRUCTED OF SCHEDULE 80 PVC, SLOTTED CASINGS WITH 0.03 INCH SLOTS AND SOLID PIPING AS INDICATED IN DRAWING. SLOTTED AND SOLID PIPE ENDS TO BE CAPPED BY SOLVENT WELD.
4. SLOTTED AND SOLID GAS VAPOR COLLECTION PIPING SHALL BE 6" DIAMETER.
5. ALL HORIZONTAL SOLID PIPING SHOULD MAINTAIN A MINIMUM SLOPE OF 1/8" PER FOOT IN ORDER TO DRAIN CONDENSATION BACK TO SOIL BENEATH THE VAPOR BARRIER. THE SYSTEM SHOULD BE INSTALLED SO THAT NO PORTION WILL ALLOW EXCESS ACCUMULATION OF CONDENSATION.
6. USE GRAY HEAVY BODIED CEMENT FOR ALL GLUED PVC JOINTS.
7. IF A CONFLICT ARISES BETWEEN THE SSDS PIPING AND STRUCTURAL, ARCHITECTURAL OR MEP ELEMENTS OF THE BUILDING, THE SSDS PIPING CAN BE RE-ALIGNED UP TO 12" IN ANY DIRECTION (HORIZONTALLY OR VERTICALLY) AS NECESSARY TO AVOID THE CONFLICT. MAINTAIN AT LEAST 6-INCHES OF GRAVEL ABOVE AND BELOW THE SSDS PIPING.
8. ALL PROPOSED PIPING/TRENCH LOCATIONS TO BE CONFIRMED AND APPROVED BY THE AUTHORITY OR AUTHORITY'S FIELD REPRESENTATIVE DURING THE TIME OF CONSTRUCTION.
9. TESTING PROCEDURES: CONTRACTOR SHALL PRESSURE TEST THE RUN OF UNDERGROUND SOLID PIPING CONNECTING SYSTEM HEADER AND VENT STACKS. TEMPORARILY PLUG PIPING AT HEADER CONNECTIONS AND TOP OF STACKS AND PRESSURIZE PIPING TO 10 PSIG WITH AIR. SOAP ALL JOINTS AND MONITOR PRESSURE GAUGE FOR 30 MINUTES MINIMUM WITHOUT LOSS IN PRESSURE. REPAIR LEAKS AND RETEST AS NECESSARY. PRESSURE TESTING SHALL BE PERFORMED IN ACCORDANCE WITH SPECIFICATION SECTION 02221, ARTICLE 3.01 B.
10. THE UNDERGROUND HEADER LINE SHALL TURN UP TOWARDS GROUND SURFACE JUST SOUTHWEST OF THE BUILDING FOOTPRINT TO A DEPTH OF 3'-6" BELOW GRADE AND THEN CONTINUE TO RUN AS SHOWN ON ENV-1 TOWARDS THE FINAL BLOWER ENCLOSURE AND VENT STACK LOCATION. REFER TO ENV-2 AND ENV-7 FOR TYPICAL PIPING AND RISER DETAILS.
11. CONTRACTOR TO VERIFY THAT VENT STACK EXHAUST LOCATION ARE A DISTANCE OF 25 FEET OR MORE FROM ANY AIR INLETS. FINAL LOCATION AND HEIGHT OF VENT STACKS SHALL BE IN ACCORDANCE WITH NEW YORK CITY BUILDING CODE. SEE ARCHITECTURAL DRAWINGS FOR DECORATIVE TREATMENT OF VENT STACK.
12. VENT STACK SHALL BE SECURELY ANCHORED WITH ADEQUATE STRUCTURAL SUPPORTS, SEE ARCHITECTURAL DRAWINGS FOR DETAILS.
13. MANUFACTURER OF FLUID APPLIED GAS VAPOR BARRIER SHALL BE LIQUID BOOT OR AUTHORITY APPROVED EQUAL.
14. GAS VAPOR BARRIER IS APPLIED TO ENTIRE FOOTPRINT OF BUILDING AND ALONG EXTERIOR SUBSURFACE WALLS.
15. REFER TO DETAILS ON ENV-2 FOR SPECIFIC LIQUID BOOT TERMINATION DETAILS.
16. CONTRACTOR TO SUBMIT SSDS BUILDING SYSTEM, SSDS SITE PIPE ROUTING, SSDS BLOWER, SSDS BLOWER ENCLOSER, SSDS BLOWER ENCLOSER PIPING LAYOUT FOR APPROVAL PRIOR TO INSTALLATION.
17. SSDS CONTRACTOR TO COORDINATE WITH ALL SITE/CIVIL WORK, GENERAL CONTRACTOR AND ANY AND ALL TRADES PRIOR TO SHOP DRAWING AND/OR INSTALLATION.
18. PROVIDE ALL ELECTRICAL POWER WIRING, CONTROL WIRING, DEVICES, APPURTENANCES, AND ASSOCIATED ELECTRICAL WORK REQUIRED FOR THE OPERATION OF THE SYSTEM AND EQUIPMENT AS PER THE CONTRACT DOCUMENTS. ALL ELECTRICAL WORK SHALL CONFORM TO ALL REQUIREMENTS OF THE NATIONAL ELECTRIC CODE AND GOVERNING SECTIONS OT THE NEW YORK STATE ELECTRICAL CODES AND ALL AUTHORITES HAVING JURISDICTION. ALL EQUIPMENT TO BE UL APPROVED.



DRAWING NOT TO BE USED FOR STRUCTURAL OR OTHER REFERENCE EXCEPT FOR SSDS

REFERENCE PROJECT SITE/CIVIL DRAWINGS FOR PROJECT COORDINATION AND ASSESSMENT OF POSSIBLE CONFLICTS. ALL SSDS ROUTING WORK TO BE VERIFIED IN FIELD AND/OR WITH OTHER CONTRACT DOCUMENTS

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

Shaw™ Environmental, Inc.

One Penn Plaza, 250 West 34th Street, 7 Floor
New York, NY 10119
T: 212.290.6000 F: 212.290.7094

No.	Date:	Revision:

KEY PLAN:

BLOCK #: LOT #:

SCA Design Manager:	S. Crociata
Principal In Charge:	A. Arrigo
Project Architect/Engineer:	A. Arrigo
Designer:	S. Morse/E. Faccioli
Drawn by:	R. Tagoff
Checked by: 3-28-07 SHAW ISSUE	S. Morse/E. Faccioli

LLW NO.'S:	FACILITY CODE:	DATE: 04-02-07

PROJECT:

METROPOLITAN AVE. SCHOOLS

1000 STUDENT HS
700 STUDENT IS/HS
LLW# 007186, LLW# 012545

DRAWING TITLE:

SUB-SLAB DEPRESSURIZATION SYSTEM - SSDS

DRAWING NO.: ENV-1

SHEETS IN CONTRACT: 478 OF 484

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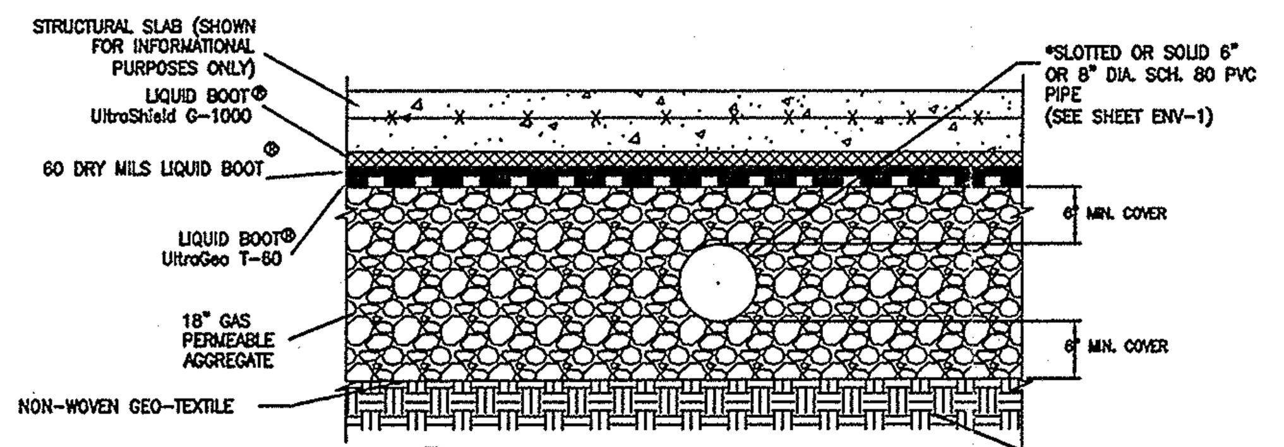
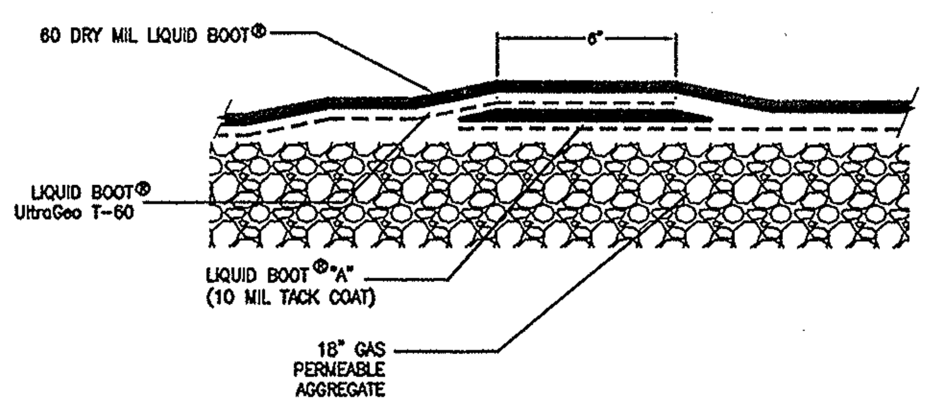
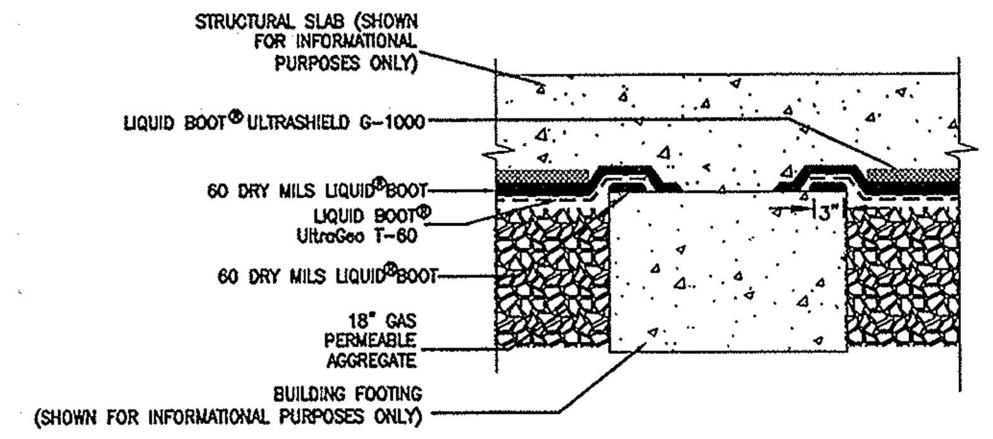
Plotted By: amy.fontana



A/ENV-2 TYPICAL SUBGRADE PIPING DETAIL
NOT TO SCALE

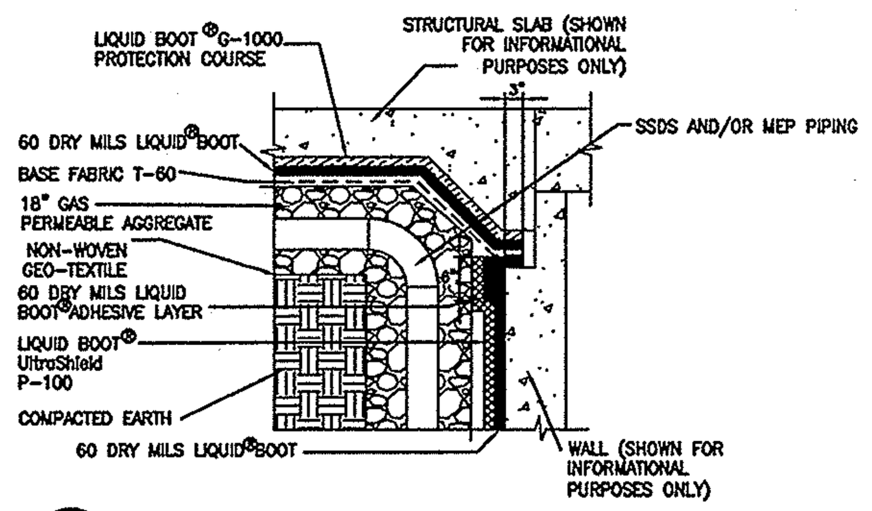


B/ENV-2 GAS VAPOR BARRIER LAP JOINTS ON GEOTEXTILE
NOT TO SCALE



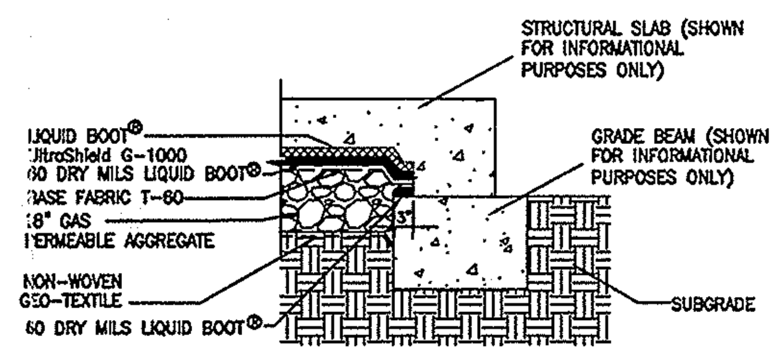
C/ENV-2 GAS VAPOR BARRIER FOOTINGS AND GRADEBEAMS
NOT TO SCALE

NOTE: BRING THE MEMBRANE ONTO THE FOOTING, THE GEOTEXTILE IS THEN ENCAPSULATED IN THE MEMBRANE.



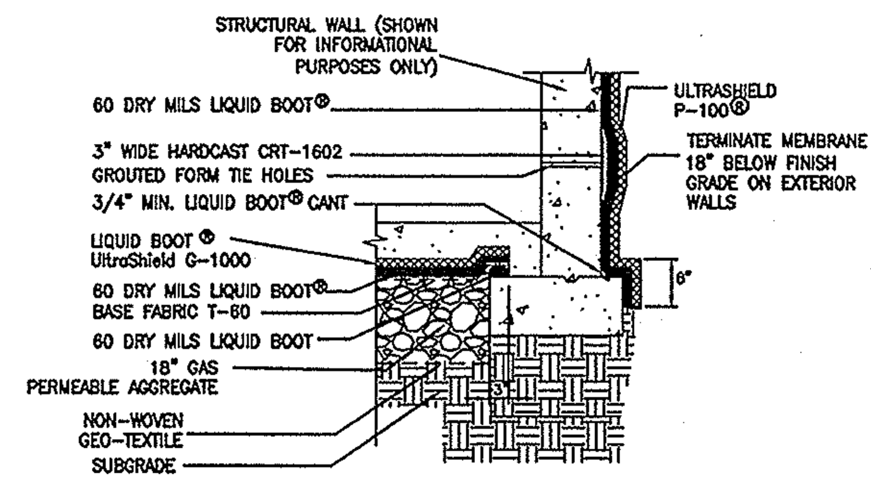
D/ENV-2 GAS VAPOR MEMBRANE SLAB ON GRADE TO FOUNDATION WALL TRANSITION
NOT TO SCALE

NOTE: BRING THE MEMBRANE 6" ONTO THE EXISTING WALL MEMBRANE

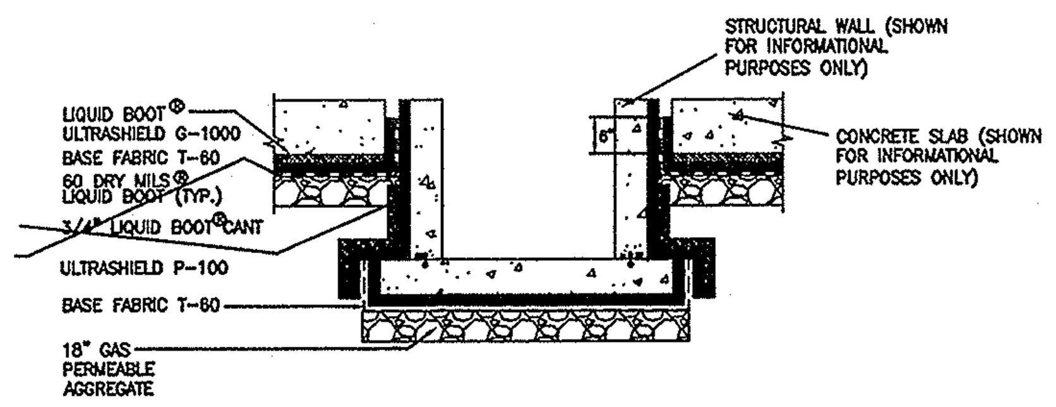


E/ENV-2 GAS VAPOR BARRIER OVER FOOTINGS & GRADE BEAMS
NOT TO SCALE

NOTE: BRING THE MEMBRANE 3" ONTO THE FOOTINGS THE GEOTEXTILE IS THEN ENCAPSULATED IN THE MEMBRANE

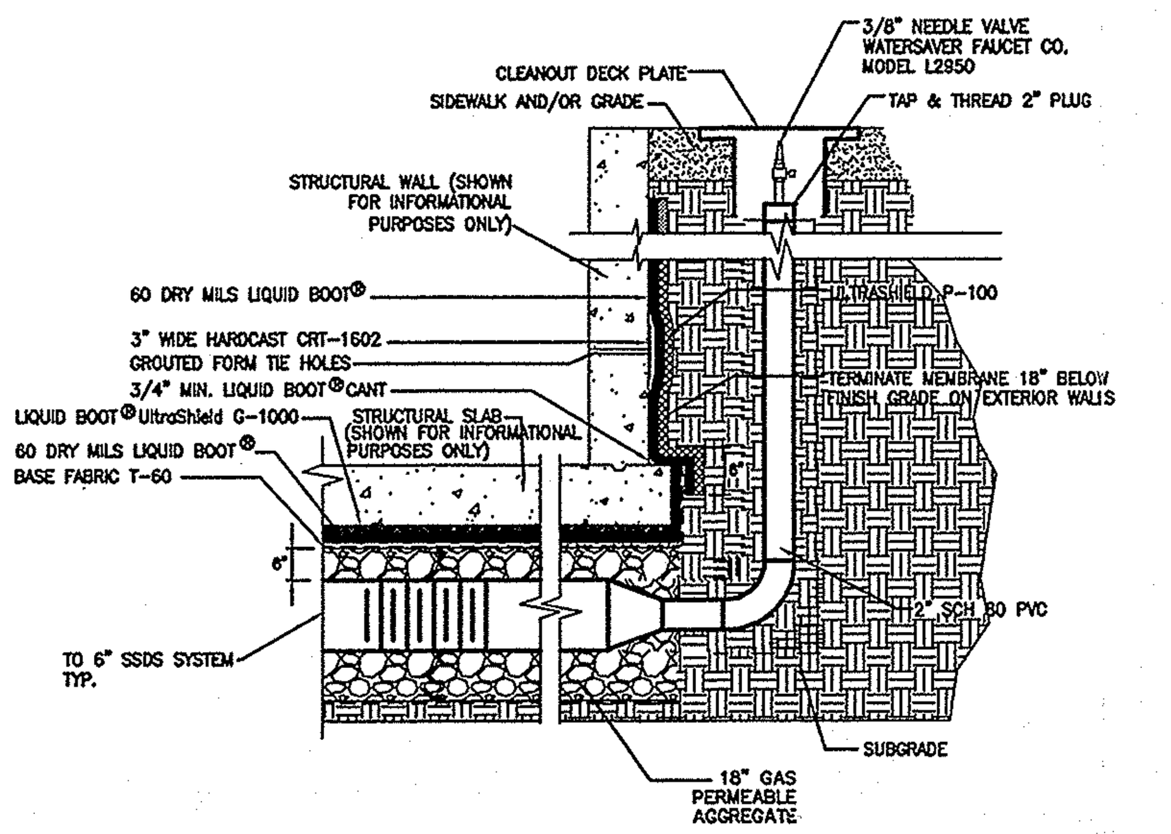


F/ENV-2 GAS VAPOR BARRIER UNDERSLAB & WALLS WITH FOOTINGS
NOT TO SCALE

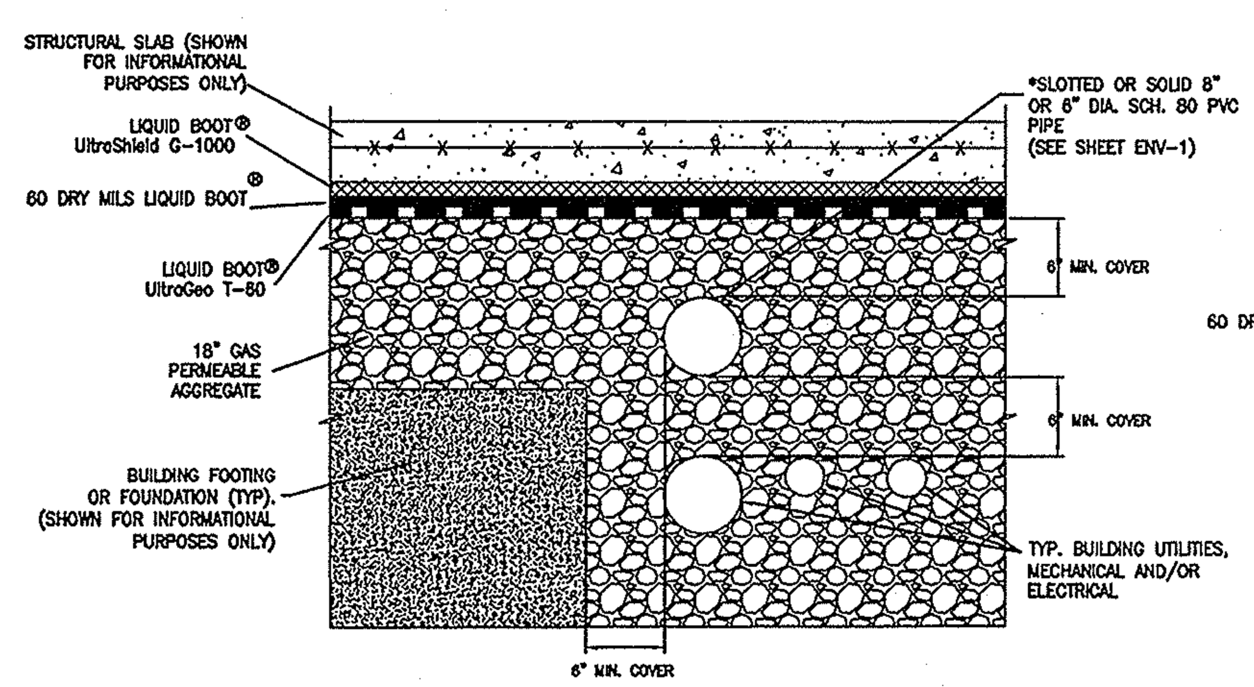


G/ENV-2 TYPICAL DETAIL AT ELEVATOR PIT/GREASE TRAP AND SEWAGE EJECTOR PITS
NOT TO SCALE

NOTE: BRING THE MEMBRANE 6" ONTO THE EXISTING WALL MEMBRANE

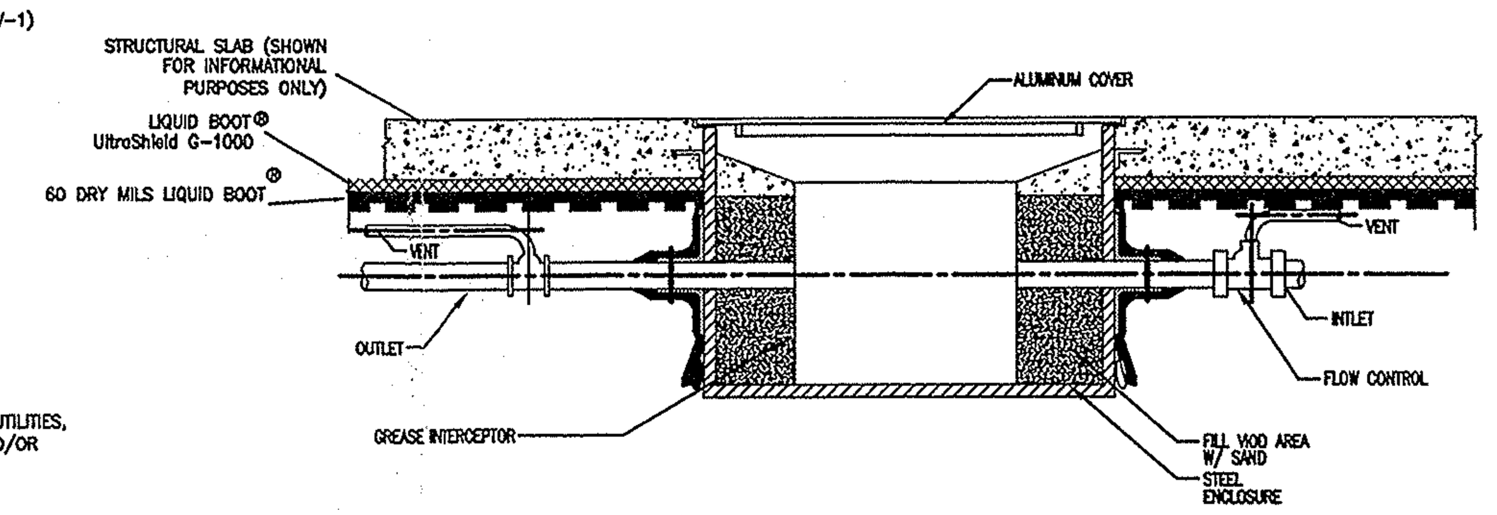


H/ENV-2 TYPICAL SAMPLING PORT
NOT TO SCALE



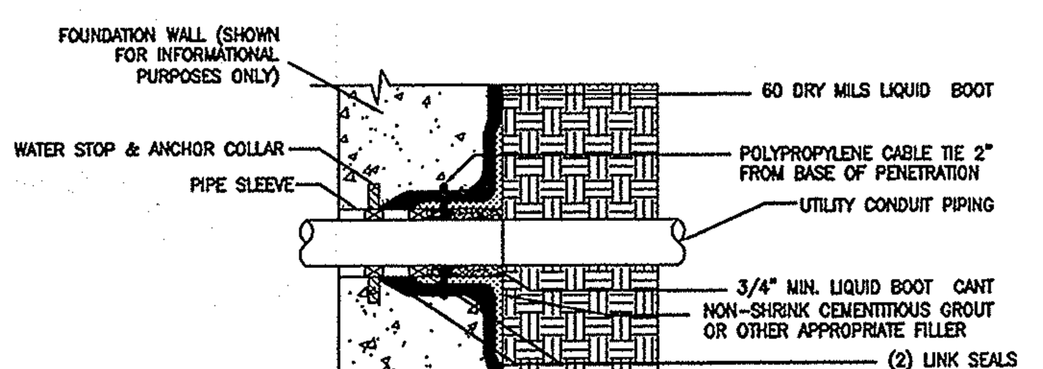
NOTE: THIS SSDS SYSTEM IS TO BE INSTALLED AT A ELEVATION OF 6" BELOW NEW BUILDING SLAB ON GRADE. THE SSDS SYSTEM MAY BE ALTERED (+/- 12") IN FIELD TO ACCOMMODATE UNFORESEEN FIELD CONDITIONS THERE WITH NEW BUILDING MECHANICAL AND ELECTRICAL UTILITIES COORDINATION

I/ENV-2 TYPICAL SUBGRADE PIPING DETAIL
NOT TO SCALE

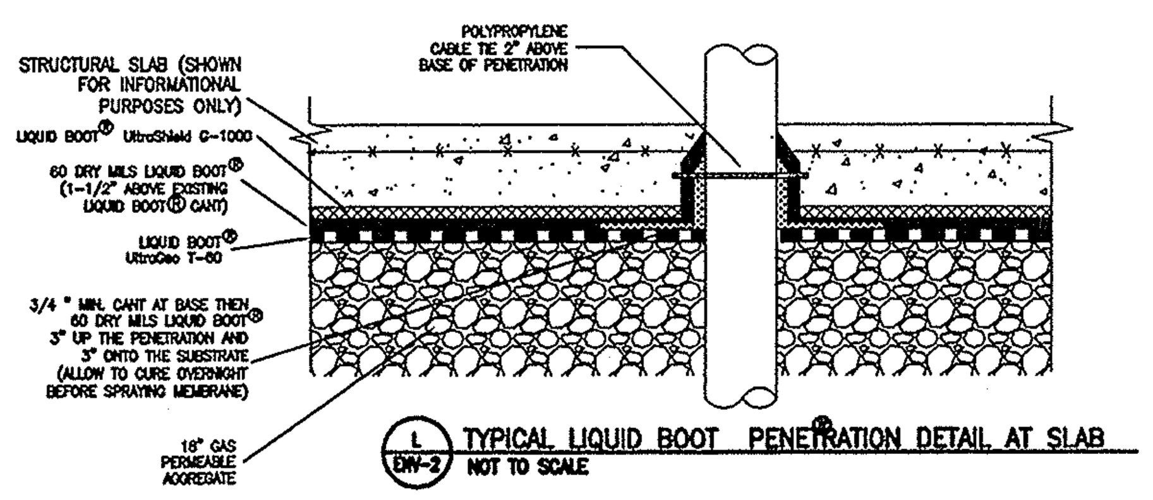


J/ENV-2 GREASE INTERCEPTOR IN STEEL ENCLOSURE
NOT TO SCALE

NOTE: GREASE INTERCEPTOR DETAILS ARE ON ARCHITECT DRAWINGS.

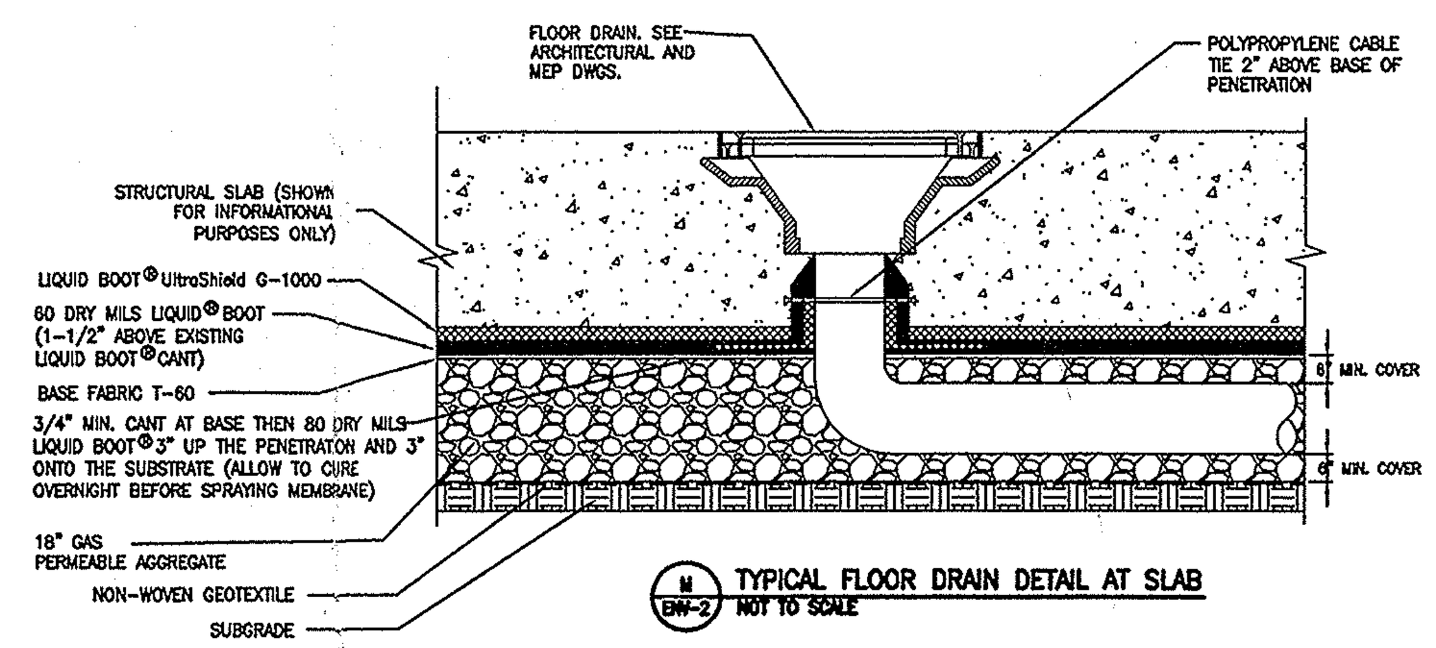


K/ENV-2 CONDUIT PENETRATION FOUNDATION WALL
NOT TO SCALE



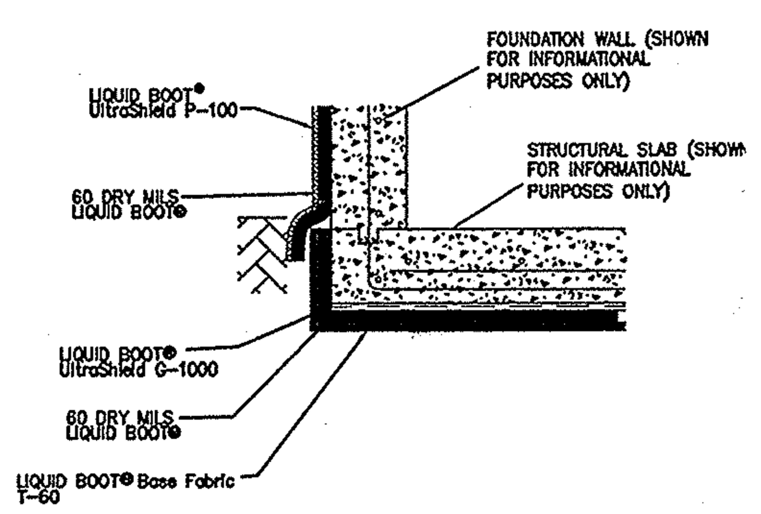
L/ENV-2 TYPICAL LIQUID BOOT® PENETRATION DETAIL AT SLAB
NOT TO SCALE

NOTE: FOR INFORMATIONAL PURPOSES. CONTRACTOR TO SUPPLY SHOP DRAWINGS OF PROPOSED METHOD FOR APPROVAL. ALL PENETRATIONS SHALL BE CLEANED PER SPECIFICATIONS BEFORE LIQUID BOOT® IS APPLIED.



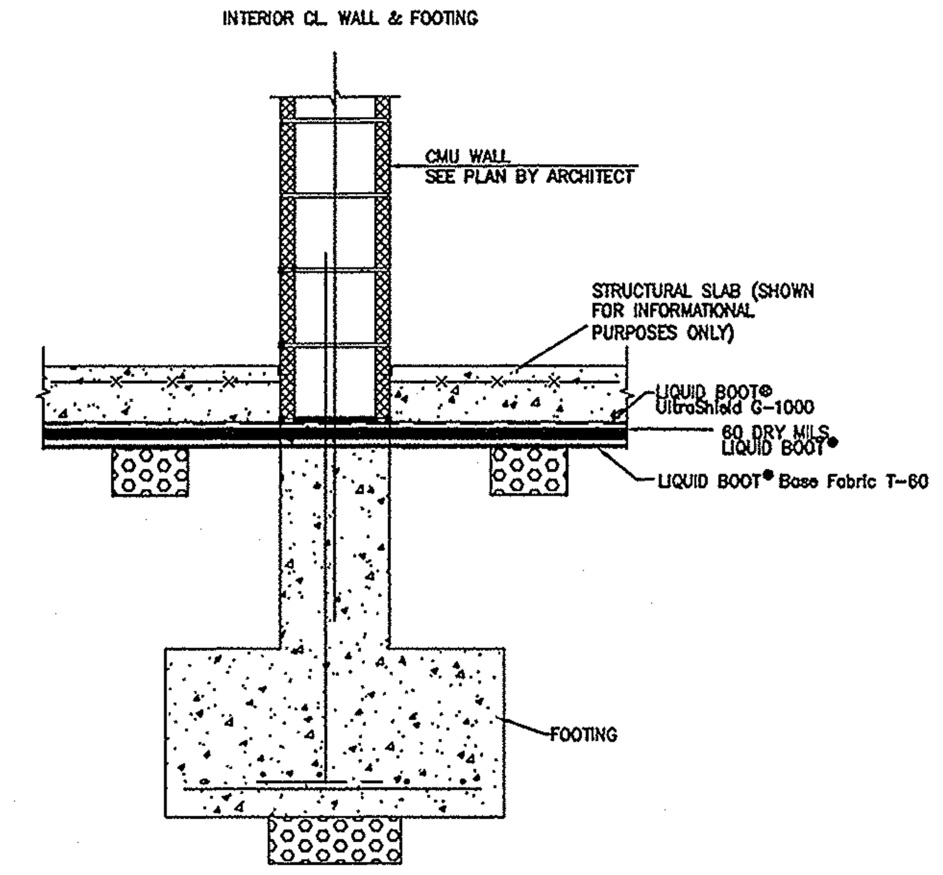
M/ENV-2 TYPICAL FLOOR DRAIN DETAIL AT SLAB
NOT TO SCALE

NOTE: ALL PENETRATIONS SHALL BE CLEANED PER SPECIFICATIONS BEFORE LIQUID BOOT® IS APPLIED.



N/ENV-2 GRADE BEAM/ FOUNDATION WALL DETAIL
NOT TO SCALE

INTERIOR CL. WALL & FOOTING



O/ENV-2 TYPICAL CMU BEARING WALL CONTINUOUS FOOTING DETAIL AT NEW SLAB ON GRADE
NOT TO SCALE

GENERAL NOTES:

1. IF A CONFLICT ARISES BETWEEN THE SSDS PIPING AND STRUCTURAL AND/OR MEP ELEMENTS OF THE BUILDING, THE SSDS PIPING CAN BE RE-ALIGNED HORIZONTALLY OR VERTICALLY 12" +/- AS NECESSARY TO AVOID THE CONFLICT. MAINTAIN AT LEAST 6-INCHES OF GRAVEL ABOVE AND BELOW THE SSDS PIPING.
2. GAS VAPOR BARRIER COMPONENTS MAY BE MANUFACTURED BY LIQUID BOOT AS SHOWN, OR AN OWNER REPRESENTATIVE APPROVED EQUAL.
3. SEE SPECIFICATION SECTION 02221

THIS DRAWING NOT TO BE USED AS STRUCTURAL OR OTHER REFERENCE EXCEPT SSDS SYSTEM.

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

Shaw™ Environmental, Inc.

One Penn Plaza, 250 West 34th Street, 7 Floor
New York, NY 10119
T: 212.290.6000 F: 212.290.7094

No.	Date:	Revision:

KEY PLAN:

BLOCK #: LOT #:

SCA Design Manager:	S. Crociata
Principal in Charge:	A. Arrigo
Project Architect/Engineer:	A. Arrigo
Designer:	S. Morse/E. Faccioli
Drawn by:	R. Togoff
Checked by: 3-28-07 SHAW ISSUE	S. Morse/E. Faccioli

LLW NO.'S:	FACILITY CODE:	DATE: 04-02-07

PROJECT:

METROPOLITAN AVE. SCHOOLS

1000 STUDENT HS
700 STUDENT IS/HS
LLW# 007186, LLW# 012545

DRAWING TITLE:

SUB-SLAB DEPRESSURIZATION SYSTEM PIPING AND GAS VAPOR BARRIER DETAILS

DRAWING NO.: ENV-2

SHEETS IN CONTRACT: 479 OF 484

INSTRUMENT INDEX

P&ID Tag	Location	Description	Stream	Flow	Inlet/Outlet	Capacity	Material	Manufacturer and Model
VI	See DWGS	Vacuum Indicator	Air	NA	4 inch	-30" WC VAC	Brass	Western Gauge Model WG22914 or approved equal
FE	Air Discharge Stack	Air Flow Element (See Note 2)	Air	600 CFM	1/2 inch	100-1000 CFM 3000 FPM	SS	Dwyer Instruments DS Series Flow Sensor Model ds-200-6" w/ Gauge Model 2001AV scale or approved equal
PI	Blower Discharge Piping	Pressure Indicator	Air	600 CFM	1/4 inch	0-10" W.C.	Brass	Western Gauge Model WG22675 or approved equal
TI	Blower Discharge Piping	Temperature Indicator	Air	600 CFM	1/2 inch	50-500°F	SS	Dwyer Instruments Model BTB3407D with 4" stem or approved equal
PDI	Across In-Line Filter	Differential Pressure Indicator	Air	600 ACFM	1/4 inch	0-30" W.C.	AL	Dwyer Capsuhelic 4000 Series Model 2030 with adjustable signal flag or approved equal

BLOWER SCHEDULE

P&ID No. or Item	Description	Stream	Flow	TDH	Inlet/Outlet Size	Motor	Mat'l. of Construction	Manufacturer and Model
F-1	IN-LINE FILTER, FLANGE	AIR	600 CFM	10"	8"/8"	NA	Carbon Steel	SOLBERG MODEL F65V-8 PAPER or Approved Equal
B-1	Ametek Blower	Air	600 CFM	10" W.C. Vacuum at Blower Inlet	4"/4"	10 HP	Carbon Steel CORROSION RESISANT	EG&G ROTRON EN909BD72WL or Approved Equal
F-2	INLET FILTER/SILENCER	Air	300 CFM	NA	4"	NA	Carbon Steel	SOLBERG MODEL FS-235P-400F POLY FILTER or Approved Equal

INSTRUMENT IDENTIFICATION TABLE

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
F	FLOW RATE	RATIO			
G	GAUGING (DIMENSIONAL)		GLASS		
H	HAND (MANUAL)				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
P	PRESSURE		POINT (TEST)		
T	TEMPERATURE			TRANSMIT	
V	VACUUM			VALVE OR DAMPER	

NOTES:

1. PROVIDE PRESSURE SNUBBERS (DWYER SERIES PS MODEL PS124) ON ALL VACUUM INDICATORS.

2. AIR FLOW METERS MUST BE INSTALLED IN A STRAIGHT RUN OF PIPE (10 PIPE DIAMETERS UPSTREAM AND 5 PIPE DIAMETERS DOWNSTREAM OF METERS).

3. SEE SPECIFICATION SECTION 15880 FOR FURTHER INFORMATION ON SSDS SYSTEM AND ACCESSORIES.

4. CONTRACTOR TO PROVIDE CONNECTION IN SSDS MOTOR STARTER/ CONTROL PANEL FOR NEW BUILDING BMS SYSTEM.

VALVE, PIPING AND EQUIPMENT SYMBOLS

BALL VALVE (NORMALLY CLOSED)

VACUUM OR PRESSURE RELIEF VALVE

BLOWER

REDUCER

FLANGE CONNECTION

FILTER

GENERAL INSTRUMENT AND CONTROL SYMBOLS

LOCALLY MOUNTED

PANEL MOUNTED

PANEL INDICATOR LIGHT

LINE SYMBOLS

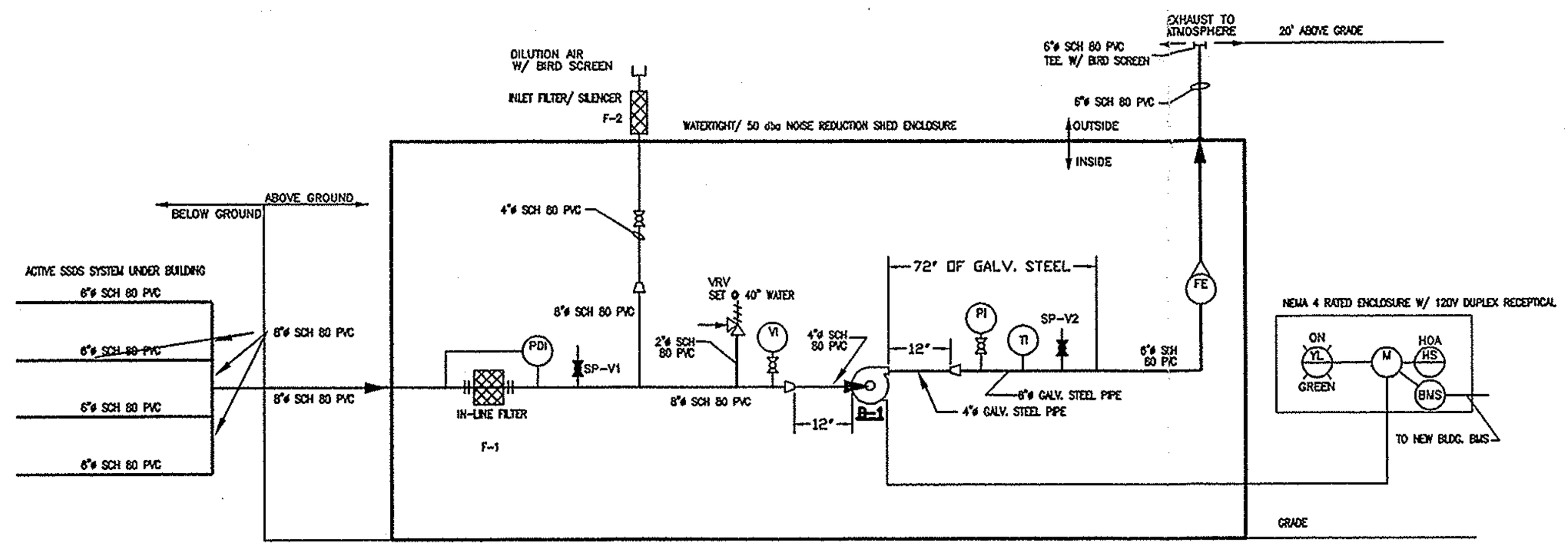
PROCESS PIPES OR CHANNELS

CONNECTION TO PROCESS, MECHANICAL LINK OR INSTRUMENT SUPPLY

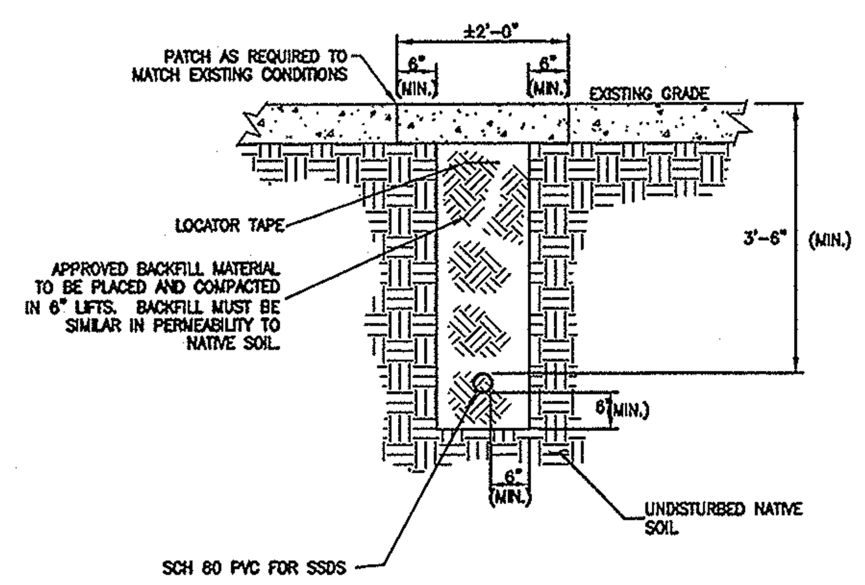
ELECTRIC SIGNAL

ABREVIATIONS USED:

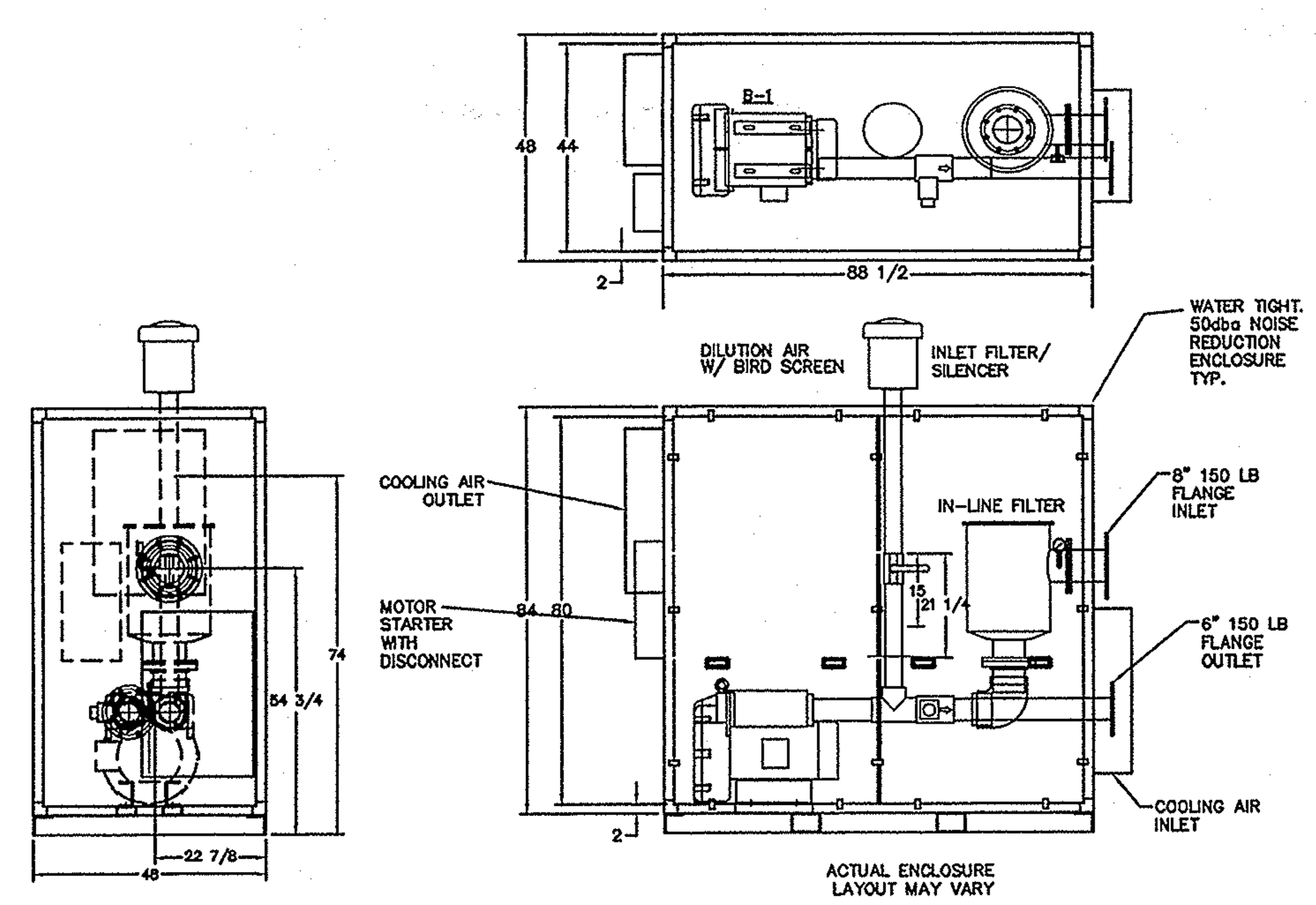
SSDS = SUB SLAB DEPRESSURIZATION SYSTEM
SVE = SOIL VAPOR EXTRACTION
PVC = POLYVINYL CHLORIDE
SP = SAMPLE PORT
CS = CARBON STEEL
SCH = SCHEDULE
GPA = GAS PERMEABLE AGGREGATE



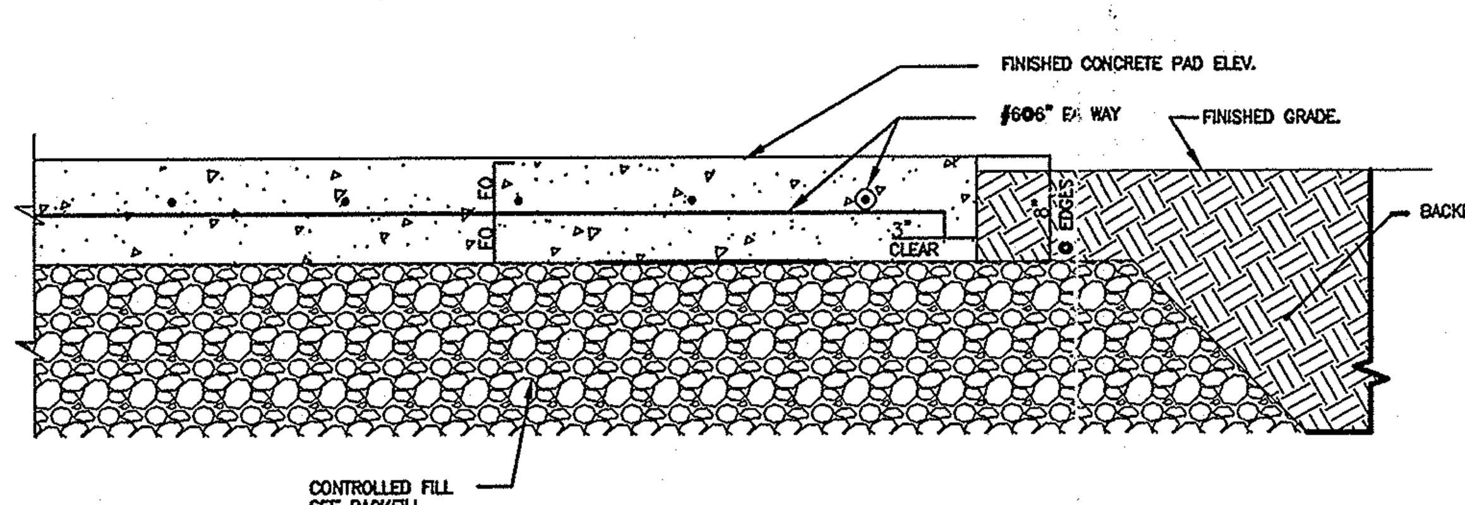
A ENV-7 P&ID
NOT TO SCALE



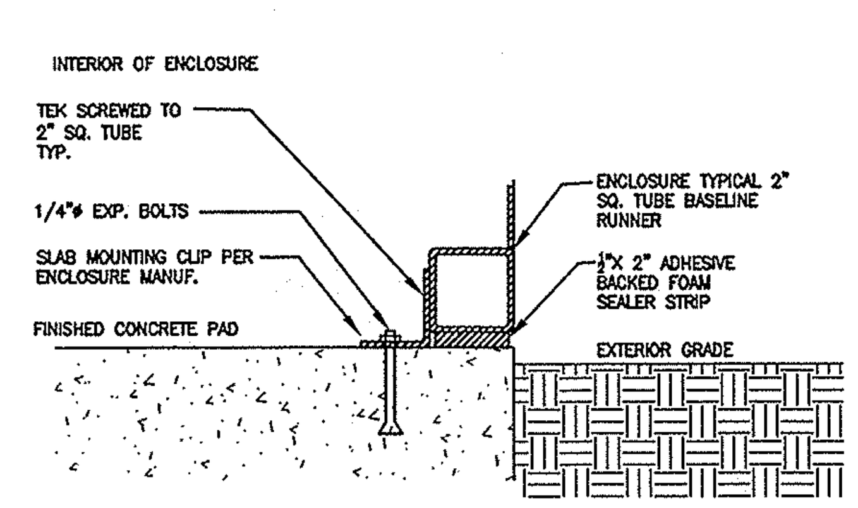
B ENV-7 TRENCHING DETAIL
NOT TO SCALE



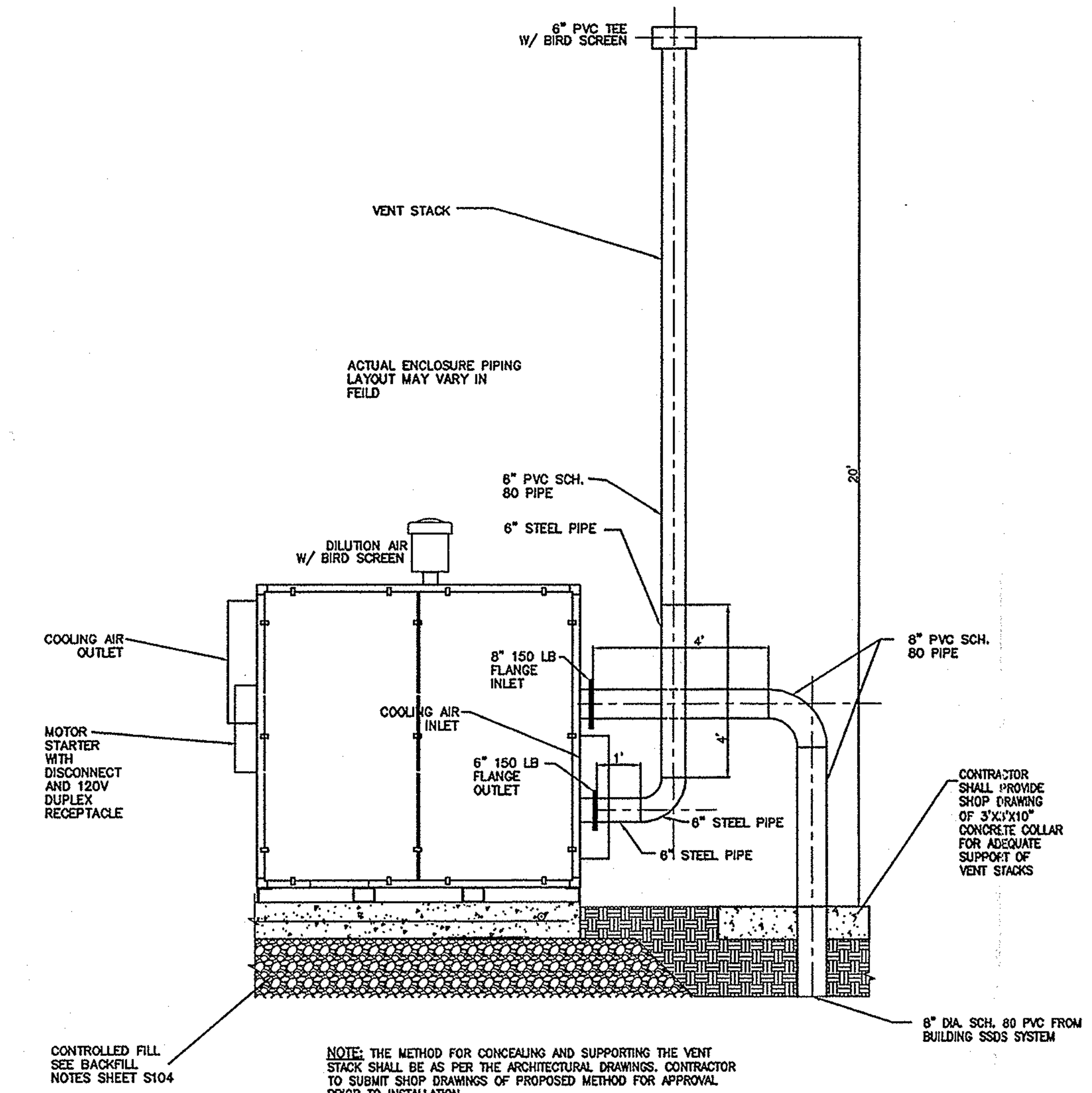
C ENV-7 SSDS BLOWER ENCLOSURE LAYOUT
NOT TO SCALE



D ENV-7 CONCRETE SLAB DETAIL
NOT TO SCALE



E ENV-7 ENCLOSURE MOUNTING DETAIL
NOT TO SCALE



NOTE: THE METHOD FOR CONCEALING AND SUPPORTING THE VENT STACK SHALL BE AS PER THE ARCHITECTURAL DRAWINGS. CONTRACTOR TO SUBMIT SHOP DRAWINGS OF PROPOSED METHOD FOR APPROVAL PRIOR TO INSTALLATION.

F ENV-7 SSDS BLOWER ENCLOSURE AND PIPING ELEVATION
NOT TO SCALE

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

Architecture & Engineering

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No.	Date:	Revision:

KEY PLAN:

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SCA Design Manager:		S. Crociata
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Drawn by:		R. Tagoff
Checked by:	3-28-07 SHAW ISSUE	S. Morse/E. Facciol
LLW NO.'S:	FACILITY CODE:	DATE: 04-02-07

PROJECT:

METROPOLITAN AVE. SCHOOLS

1000 STUDENT HS
700 STUDENT IS/HS
LLW# 007186, LLW# 012545

DRAWING TITLE:

ACTIVE SSDS P&ID AND LAYOUT

DRAWING NO.: ENV-7

SHEETS IN CONTRACT: 484 OF 484

APPENDIX H

SPECIFICATIONS AND DRAWINGS FOR SUB SLAB DEPRESSURIZATION SYSTEM

SECTION 02221
SUB-SLAB DEPRESSURIZATION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Furnish and install a sub-slab depressurization system (SSDS) as specified, as shown on Drawings ENV-1, ENV-2, and ENV-7, and as directed by the Authority. The Contractor shall furnish and install a SSDS complete and ready for use. The SSDS shall depressurize the entire building floor slab, creating a differential pressure: lower pressure in the gas permeable aggregate layer below the floor slab than in the building interior. The SSDS shall be connected to the Building Management System (BMS).

B. Furnish and install a geotextile placed directly on the compacted subbase, and an 18-inch thick gas permeable aggregate layer with a network of 6-inch Schedule 80 slotted PVC piping and 6" and 8" -inch Schedule 80 solid PVC piping. The 8" PVC collection header piping network exits the building perimeter approximately in the middle of the south exterior wall. The buried 8" PVC collection pipe continues to an above grade enclosure containing a exhaust blower, filter and control system located in the southwest corner of the site. The SSDS blower, filter and control system shall be connected to the Building Management System (BMS).

C. Beneath the entire building, as shown on the Drawings, the Contractor shall install directly above the gas permeable aggregate layer a base fabric and fluid applied gas vapor barrier. All penetrations through the gas vapor barrier shall be sealed as shown, specified and directed by the Authority.

D. The Contractor shall furnish and install sub-slab monitoring points as part of the SSDS.

E. Furnish, install, and test all system components as indicated, specified and required in the Contract Documents, as shown on the Drawings and as directed by the Authority.

F. All materials and equipment furnished under this section shall be new, in first-class condition, supplied directly from original equipment manufacturers, and installed in

accordance with the manufacturers' recommendations.

1.02 RELATED SECTIONS

A. Environmental Site Assessment Reports. . Section 02010

B. Storage, Handling, Transportation and Disposal of Non-Hazardous Industrial Waste and/or Hazardous Waste.....Section 02091

C. Site Preparation . . . . . Section 02100

D. Earthwork . . . . . Sections 02200 & 02200A

E. Gas Vapor Barrier (Fluid Applied) . . . Section 02220

F. Coordination. . . . . Section 02222

G. Cast-in-Place Concrete. . . . . Section 03300

H. Perimeter Foundation Insulation. . . . . Section 07211

I. Miscellaneous Building Insulation. . . . Section 07212

J. Sub-Slab Depressurization System Accessories.....Section 15880

I. Installation of Piping and Conduits. . . . . Division 15 & Division 16

1.03 STANDARDS AND REGULATIONS

A. Comply with applicable portions of the Building Code of the City of New York. Where requirements for products, materials, equipment, methods and other portion of the work specified herein exceed minimum requirements of New York City Building Code, contractor shall comply with such requirements specified herein, unless specifically approved otherwise by the Authority.

B. Standards listed below are referenced in this section.

1. American Society for Testing and Materials (ASTM)

2. American Standards Association (ASA)

3. American National Standards Institute (ANSI)

1.04 RESTRICTIONS AND QUALITY CONTROL

A. Preinstallation Meeting: Convene a preinstallation meeting prior to the start of SSDS installation. Require attendance of parties directly affecting work of this section, including Contractor, Architect/Engineer, and installer. Review installation, protection, and coordination with other work.

B. Quality Control Inspections shall be performed throughout the installation by the Authority or its authorized representative in accordance with the attached Milestones Schedule and as is deemed necessary or appropriate by the Authority.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including installation instructions.

1. For exhaust blower, submit manufacturers' data regarding flow rate, noise, fan speed, static pressure, efficiency, performance curve, motor requirements, materials of construction and complete catalogue information, including accessories.

2. For all piping, couplings and fittings submit manufacturer's data regarding materials of construction, operable pressure ranges, collapse pressure, compatibility with fluids, temperature tolerances and complete catalogue information.

B. Samples - Submit representative samples of the following for approval:

1. Non-woven geotextile

2. Polyvinyl Chloride (PVC) pipe & fittings

C. Submit manufacturer's instructions for installation of fire stop materials for sleeves for pipes.

D. Submit Shop Drawings for all piping installations.

E. Pipe Schedule: Itemize pipe and fitting materials for each specified application.

F. Material Test Reports: Indicate and interpret test

results for compliance of materials with requirements indicated, as applicable.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened contents and packaging, with labels clearly identifying product and manufacturer.

B. Deliver pipe materials properly protected, and undamaged.

C. Store materials in a clean, dry area in accordance with manufacturer's instructions.

D. Properly protect all piping so as to prevent damage to the pipe or the introduction of foreign material into the pipe. For the purpose of protecting piping from pre-installation contamination, all piping shall be shipped to job site with suitable caps, sheet metal covers or plugs. Pipe caps shall not be removed until just before installation.

E. Examine all pipe and fittings before laying. Do not install any piece that is found to be defective. Protect materials during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS AND ACCESSORIES

A. NON-WOVEN GEOTEXTILE

Geotextile material to be placed on prepared subgrade below the gas permeable aggregate layer shall be a non-woven polypropylene type, such as Mirafi N-Series product type 140NL or approved equal and having the following properties:

Property/Test Method	Units	Value
MECHANICAL PROPERTIES		
Grab Tensile Strength		
ASTM D 4632	kN (lbs)	0.40 (90)
Grab Tensile Elongation		
ASTM D 4632	%	50
Mullen Burst Strength		
ASTM D 3786	kPa (psi)	1205 (175)
Trapezoidal Tear Strength		
ASTM D 4533	kN (lbs)	0.18 (40)

Puncture Strength		
ASTM D 4833	kN (lbs)	0.24 (55)
UV Resistance at 500 hrs.		
ASTM D 4355	% Strength retained	70
HYDRAULIC PROPERTIES		
Apparent Opening Size (AOS)		
ASTM D 4751	mm (US Sieve)	0.25 (60)
Permittivity		
ASTM D 4491	sec-1	2.0
Flow Rate		
ASTM D 4491	L/min/m2 (Gal/min/ft2)	5907 (145)
NOTE: All Mechanical Properties and Hydraulic Properties shown are Minimum Average Roll Values (MARV).		

B. GAS PERMEABLE AGGREGATE LAYER

Gas permeable aggregate layer shall be rounded stone as specified in Section 02200, Article 2.01G.

C. SUB-SLAB PIPE NETWORK AND APPURTANCES

1. Polyvinyl Chloride (PVC) pipe installed in gas permeable aggregate layer shall be 6-inch and 8-inch diameter Schedule 80 pipe as shown on the Drawings. Schedule 80 PVC solid header, slotted piping, and solid risers shall be installed as shown in Contract Drawing ENV-1 and ENV-2. Raw, unslotted pipe shall have a wall thickness of 0.432-inches, a max working pressure of 73 degrees F and weigh approximately 531 lbs/100-feet. The slotted pipe shall have 6 rows of 0.03-inch slots along the circumference of the pipe. The slots shall be cut continuously with solid pipe maintained as per manufacturer's recommendations. Slot spacing shall be 0.25 inches throughout the length of each pipe. The inside and outside slot lengths of the 6-inch diameter pipe shall be 1.5 and 2.75 inches, respectively. Piping shall be installed as shown on the Drawings. The pipe shall comply with application provision and recommendations of the following except as otherwise shown or specified: ASTM D 1784, ASTM D 1785, and Grade 1 Type 1 Cell Classification 12454-B.

2. All PVC fittings shall be of the same manufacturer, material, class, and Schedule as the pipe. Flange joints shall be provided with nitrile or urethane gaskets.

D. MONITORING POINTS

1. Monitoring points shall be installed where shown on the Drawings. Monitoring points shall be constructed with 2-inch diameter Schedule 80 PVC pipe as shown on the Drawings.

2. Sub-slab monitoring points shall terminate four inches below the top of the gas permeable aggregate layer.

3. Access cover shall be flush mounted 6-inch diameter cast iron cleanout manufactured by Jay R. Smith Manufacturing Co, #4231L or approved equal.

4. Two-inch diameter PVC pipe shall be completed with a plug and 3/8-inch needle valve as shown on Drawing ENV-2.

E. GAS VAPOR BARRIER (FLUID APPLIED)

Fluid Applied Gas Vapor Barrier System shall be as specified in Section 02220 Gas Vapor Barrier (Fluid Applied).

F. FITTINGS

1. Fittings for PVC Pipe:

a. All fittings shall be of the same manufacturer, material, class, and schedule as the pipe. Any required threaded joints shall be provided with Teflon tape or flange joints with nitrile or urethane gaskets.

G. SLEEVES FOR PIPES

1. Sheet metal sleeves shall be 20 gauge.

2. Pipe sleeves shall be service weight cast iron pipe or schedule 40 galvanized steel pipe.

3. Fire stop penetration materials for sealing sleeves shall be listed by Underwriters Laboratories and

shall have Material and Equipment Acceptance (MEA) approval.

4. Materials for sealing space between each pipe and sleeve through non-fire rated exterior walls above grade shall be non-shrinking cement.

5. Waterproof sleeves shall be Link-Seal Wall Sleeve as manufactured by Thunderline Corp, or MetraSeal wall sleeve by the Metraflex Co.

H. EXHAUST BLOWER

1. See Section 15880 Sub-Slab Depressurization System Accessories for suction fan requirements.

2. On discharge of exhaust blower, install a 6-inch Schedule 80 PVC tee with bird screen.

I. GENERAL

Provide additional installation accessories as necessary for a complete SSDS, ready to use. Ensure accessories are from same manufacturer as specified products.

PART 3 - EXECUTION

3.01 EXAMINATION/INSPECTION

At a minimum, all components identified on the following Inspection Schedule for the installation of the SSDS shall be inspected and approved by the Authority upon completion of each phase of Work. Additional inspections, examinations and quality control measures may be required as per manufacturer's recommendation and are the responsibility of the Contractor. The Authority reserves the right to perform additional inspections or quality control tests as deemed necessary by the Authority at any point during the construction process.

A. INSPECTION SCHEDULE

#	Inspection Schedule - Milestone Description
1	Subbase preparation following foundation footer.
2	Installation of Sch. 80 PVC collection pipe network and riser "stub-outs" prior to completion of gas permeable aggregate layer. Pressure testing of underground lines shall be performed prior to backfilling. **See following information regarding test requirements.**
3	Installation of non-woven geotextile protective

	underliner.
4	All fluid applied gas vapor barrier appurtances and seals following the specified curing time.
5	Application of fluid applied gas vapor barrier at all penetrations, installation of overlying geotextile, geotextile overlaps and foundation contact points.
6	Coating thickness inspection as required by manufacturer (1/500 square feet minimum).
7	Final Inspection of all SSDS subsurface components prior to concrete slab pours.
8	Completed installation of exterior risers.
9	Final inspection of completed system.

B. PRESSURE TESTING

1. Contractor shall pressure test the run of 8" PVC underground solid sub-slab depressurization header and collection piping back to enclosure prior to backfilling and acceptance. (The 6" PVC solid and slotted piping will not be tested) The Contractor is responsible for scheduling times for inspections and tests as well as notifying the Authority of the schedule. The Contractor shall temporarily isolate piping with valves, plugs, caps, and/or blind flanges, at header connections and top of stacks and pressurize piping to 10 PSIG with air. Soap all joints and monitor with a pressure gauge for thirty minutes. Piping shall remain at the test pressure with no leaks or loss in pressure to pass the test procedure for piping systems tested. Contractor is responsible for all equipment and instrumentation necessary to complete the test.

2. Pipe systems or sections that fail pressure testing shall be repaired or replaced by the Contractor at no cost to the Authority.

3.02 SURFACE PREPARATION

Preparation of all surfaces prior to the installation of the SSDS shall be as specified in the Contract Documents and Plans.

3.03 INSTALLATION

All components of the SSDS shall be installed as specified in the Contract Documents and Plans.

A. INSTALLATION OF THE GEOTEXTILE ABOVE PREPARED SOIL

SUBGRADE

The subbase shall be excavated to a minimum depth of 18 inches below the elevation of the bottom of the floor slab to the extents of the SSDS system, as shown on the Contract Drawings. The non-woven geotextile shall be placed on the subbase, overlapped and secured in accordance with the manufacturer's recommendations.

B. INSTALLATION OF THE GAS PERMEABLE AGGREGATE AND COLLECTION PIPE NETWORK

1. A 6-inch layer of gas permeable aggregate shall be placed and compacted as necessary on the geotextile. The SSDS pipe network shall be assembled and installed as shown on the Contract Drawings. Aggregate shall be placed a minimum of one pipe diameter beyond both sides of the pipe to maintain the correct layout prior to inspection. Schedule 80 PVC pipe at riser penetration locations shall be assembled and placed with supports as necessary for structural stability. Offset piping shall be provided where necessary to accommodate gravity drainage and other utilities.

2. Following inspection of SSDS piping layout and approval by the Authority, gas permeable aggregate shall be placed and backfilled to the bottom of slab elevation.

C. APPLICATION OF THE FLUID APPLIED SOIL GAS VAPOR BARRIER

1. The fluid applied gas vapor barrier shall be installed as per Section 02220 Gas Vapor Barrier (Fluid Applied).

D. INSTALLATION OF THE VENT RISERS AND VENTILAOR CAPS

1. Vent riser shall be as identified in the Contract Documents and Drawings. One vent riser shall be installed, tested, labeled and enclosed, as identified in the Contract Documents and Drawings.

2. The exhaust blower shall be capped with a 6-inch Schedule 80 PVC tee with bird screen as detailed on Drawing ENV-7.

E. PIPING (GENERAL)

1. The run and arrangements of all pipes shall be approximately as shown on Contract Drawings or specified and as directed during installation, and shall be as straight and direct as possible, forming right angles or parallel lines with building walls and other pipes, and neatly spaced.

2. Roughing underground shall be properly installed, tested and inspected before any of the roughing is covered up. Should any work be covered up before being inspected and tested, it shall be uncovered and recovered at the expense of the Contractor. Plugged fittings shall be installed when called for.

F. PIPING JOINTS

1. Solvent-cementing:

a. Remove all burrs, chips, filings, and other debris from the pipe i.d. and o.d. before joining.

b. All pipe ends should be beveled to minimize the chances of wiping the solvent cement from the i.d. of the fitting as the pipe is socketed. Beveling can be done with the coarse file or beveling tool.

c. Using a clean, dry cotton rag, wipe away all loose dirt and moisture from the i.d. and o.d. of the pipe end and the i.d. of the fitting. Do not attempt to solvent-cement wet surfaces.

d. Using a natural-bristle brush about one-half the width of the pipe diameter to be joined, apply primer freely to the inner fitting socket. Keep the surface wet by continuously brushing the entire surface for 5 to 15 seconds. Redip the applicators as necessary, but avoid puddling inside the fitting. Reapply primer to the fitting socket.

e. Apply primer to the pipe surface in the same manner, making sure that the length of pipe evenly covered is at least equal to the fitting socket depth.

f. Using a second clean natural-bristle brush one-half the size of the pipe diameter, apply

a heavy coat of solvent cement to the male end of the pipe. Next apply a liberal coat of solvent cement to the inside of the socket using straight outward strokes to keep excess cement out of the socket.

g. While both surfaces are still wet with solvent cement, insert the pipe into the socket with a twisting motion. The pipe must go to the bottom of the socket. The application of solvent cement to pipe and fitting, and the insertion of pipe into the fitting, should be completed in less than 1 minute. Hold the joints together for approximately 30 seconds until both surfaces are firmly gripped.

h. After solvent-cementing, hold joints together for 30 seconds until both surfaces are firmly gripped. Allow proper set time before disturbing joints. The initial set time prior to installation is as follows:

Temperature Range	**Pipe Sizes 1/4"-1/2"**	**Pipe Sizes 1½"-3"**	**Pipe Sizes 4"-8"**	**Pipe Sizes 10"-16"**	**Pipe Sizes 18"-24"**
60°-100°F	15 Min.	30 Min.	1 Hr.	2 Hr.	3 Hr.
40°-60°F	1 Hr.	2 Hr.	4 Hr.	8 Hr.	12 Hr.
0°-40°F	3 Hr.	6 Hr.	12 Hr.	24 Hr.	36 Hr.

G. OFFSET PIPING

1. Offset piping shall be provided where necessary to accommodate gravity drainage and other utilities. Installation of offsets shall be made with 45 degree fittings to minimize the system pressure drop across the offset.

3.04 PIPE AND FITTING SCHEDULE

A. Sub-Slab Depressurization System

PVC pipe Schedule 80 slotted and solid with welded joints.

3.05 PROTECTION

It is the responsibility of the Contractor to ensure that no damage occurs to components of the SSDS prior to, during or following installation of system, or during any subsequent performance of construction for the facility as identified on the Contract Drawings and plans. This includes the installation of all subsurface utilities required for the operation of building systems. Any damages to the SSDS during performance of the Work shall be repaired and tested at no additional cost to the Authority.

END OF SECTION

LIST OF SUBMITTALS

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Product Data:		
1. Mfs's product data for SSDS components.	_____	_____
OR		
Contractor's affidavit Stating compliance with Piping materials requirements	_____	_____
2. Shop Drawings: showing Building SSDS System Layout	_____	_____
3. Schedule		
A. Pipe & fittings	_____	_____
B. Polyvinyl Chloride pipe & fittings	_____	_____
4. SSDS PVC Pipe joint method a specification		

* * *

SECTION 15880
SUB-SLAB DEPRESSURIZATION SYSTEM ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Furnish and install blower connecting to sub-slab depressurization system (SSDS) piping network in order to create vacuum pressure in the sub-slab gas permeable aggregate layer below the building. The SSDS blower systems shall be connected to the Building Management System (BMS).

B. Furnish and install enclosure, inline filter, vacuum and pressure gauges, differential gauges, relief valve, Dilution air filter, air flow element, air flow switches, volume controlling dampers, blower motor starter, electrical equipment and hardware, wiring, interlocks and controls, volume controlling valves, concrete pad, mounting as required and necessary for a complete and functioning SSDS system.

C. Blower shall be connected to an uninterruptible power supply. The blower shall be provided with a local power disconnect switch. Indicators shall be provided in the BMS to show the following conditions: running and low flow.

D. Provide portable pressure gauge ports to monitor vacuum pressure at sampling ports located at grade surrounding the building, as shown on the Drawings. Provide necessary parts to connect pressure gauges to sampling ports.

E. Furnish, install, and test all system components and accessories as indicated, specified and required in the Contract Documents, as shown on the Drawings, as indicated in Section 02221 and as directed by the Authority.

F. All materials and equipment furnished under this section shall be new, in first-class condition, supplied directly from original equipment manufacturers and installed in accordance with manufacturers' recommendations.

1.02 RELATED SECTIONS

A. Environmental Site Assessment Reports. . Section 02010

B. Storage, Handling, Transportation and Disposal of Non-Hazardous Industrial Waste and/or Hazardous Waste . . . . . .Section 02091

C. Site Preparation . . . . . Section 02100

D. Earthwork . . . . . Sections 02200 & 02200A

E. Gas Vapor Barrier (Fluid Applied) . . . . Section 02220

F. Sub-Slab Depressurization System . . . . . Section 02221

G. Cast-in-Place Concrete . . . . . Section 03300

H. Perimeter Foundation Insulation . . . . Section 07211

I. Miscellaneous Building Insulation . . . Section 07212

I. Installation of Piping and Conduits . . . Division 15 and Division 16

1.03 STANDARDS AND REGULATIONS

A. Comply with applicable portions of the Building Code of the City of New York. Where requirements for products, materials, equipment, methods and other portion of the work specified herein exceed minimum requirements of New York City Building Code, Contractor shall comply with such requirements specified herein, unless specifically approved otherwise by the Authority.

B. Standards listed below are referenced in this section.

1. American Society for Testing and Materials (ASTM)

2. American Standards Association (ASA)

3. American National Standards Institute (ANSI)

4. National Fire Protection Association (NFPA)

1.04 RESTRICTIONS AND QUALITY CONTROL

A. Preinstallation Meeting: Convene a preinstallation meeting prior to the start of blower installation. Require attendance of parties directly affecting work of this section, including Contractor, Architect/Engineer, and installer. Review installation, protection, and

coordination with other work.

B. Quality Control Inspections shall be performed throughout the installation by the Authority or its authorized representative in accordance with the attached Milestones Schedule and as is deemed necessary or appropriate by the Authority.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's product data, including installation instructions for blowers, switches, dampers, and pressure gauges. Submit complete shop drawings of all work related to installation of blowers, showing dimensions and locations of all items including clearance requirements. Submit elementary electric control schematic diagrams, interconnecting wiring diagrams, and electric motor data sheets.

B. Professional Engineer's Certification: Submit certification prepared, signed, and sealed by a New York State licensed Professional Engineer. Certification shall state that Professional Engineer certifies that all components installed are properly supported for anticipated loads, including wind loads for exterior mounted equipment.

C. Submit owner's manuals/operations and maintenance manuals for blower, switches, and pressure gauges.

D. Submit name, address, and telephone number of manufacturer authorized service technician for blower.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in manufacturer's original packaging, with labels clearly identifying product and manufacturer.

B. Store materials in a clean, dry area in accordance with manufacturer's instructions.

C. Protect materials during handling and installation to prevent damage.

D. Examine all blowers before installation. Do not install any unit that is found to be defective. Protect all materials during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.01 ACCESSORIES

A. BLOWERS

Blowers shall be Direct Drive capable of providing a flow rate of 600 SCFM and a vacuum of 100" water column at a 75% efficiency. The blower shall have an inlet/outlet diameter of 4.00" I.D. and a weight (w/ motor) of 564 lb.

Regenerative Blower shall be a sealed regenerative blower ISO-9001 compliant, Explosion-Proof. Impeller shall be cast aluminum housing, cover, impeller and manifold to be cast iron flanges, Teflon lip seal, Corrosion resistant. Sealed blower assembly.

UL and CSA approved motor sealed ball bearings for explosive atmospheres Class 1 Group D Minimum

Quiet operation within OSHA standards.

The motor shall be single phase 10 HP, 60 Hz, 230 V, totally enclosed and fan cooled with NEMA mounting. The motor shall be explosion-proof. Provide a local disconnect switch for manual termination of blower.

Blowers shall follow the following general requirements.

1. Blowers shall suitable for use with Hazardous Classification Class 1, Division 2, Type D.

2. Blower shall be all-weather resistant.

3. Blower shall be fireproof - spark resistant, and corrosion resistant.

4. Blower shall contain a pressure gauge, or a pressure gauge shall be installed in the vent riser to assure the minimum 1/4" water column vacuum pressure is met.

B. DAMPERS

Dampers shall be Volume Controlling Dampers with Continuous Adjustment Lock. Material shall be PPs - Flame Retardant Polypropylene as supplied by manufacturer of blower.

C. FLOW SENSOR

1. Flow sensor shall be averaging pitot tube type for accurate air flow rate sensing in piping, size to be as indicated on project documents. Flow sensor to be rated for 200 PSI, 200 degrees F, and furnished with instrument shut off valves on both pressure connections. Flow sensor to be mounted through a 1/4" NPT fitting in the blower discharge piping before the vent stack. Sensor to detect low or no flow in vent pipe. Set point to be approved by Authority. The sensor shall be weather proof, explosion proof and suitable for use in NEC Class 1, Division 2, Group D hazardous locations.

2. The flow sensor shall be accompanied by a direct readable air flow gauge. Accuracy to be +/- 3%, .5" water column, can be used in ambient temperature of 0 to 200 degrees F.

D. PORTABLE PRESSURE GAUGES

1. Four portable pressure gauges to measure the gas pressure (vacuum) at each SSDS and sub-slab monitoring point shall be furnished to the Authority or designated representative.

2. The gauges shall be accurate within 2% and indicate directly in inches water column positive, negative, or differential pressure in the following ranges at the specified increments:

Range (in. water)	Minor Divisions (in. water)
0-0.50	0.01
0-1.0	0.02
0-5.0	0.10

3. Each gauge shall be furnished with carrying case, nine feet of 3/16-inch ID rubber tubing, standhang bracket and terminal tube holder. Supply with tubing fittings, compatible with fittings for monitoring points.

E. GENERAL

Provide additional installation accessories as necessary. Ensure accessories are from same manufacturer as product.

F. ENCLOSURE

The Contractor shall provide new SSDS enclosure for the extraction and treatment system as specified in the Contract Drawings.

1. The size and layout of the SSDS enclosure shall be adequate for easy movement and access to equipment and controls and/ as per contract documents.

2. The area inside the enclosure housing the equipment shall be classified as Class I, Division 2, Group D. All electrical Work pertaining to the enclosure will be designed to meet the requirements of this classification.

3. Security measures (e.g. locks, etc.) shall be provided to prevent access to the system by unauthorized persons;

4. Enclosure shall be new and shall comply with all applicable federal, state and municipal safety codes;

5. The size and layout of the SSDS enclosure shall be adequate for easy movement and access to equipment and controls and/ as per contract documents.

6. The area inside the enclosure housing the equipment shall be classified as Class I, Division 2, Group D. All electrical Work pertaining to the enclosure will be designed to meet the requirements of this classification.

7. Security measures (e.g. locks, etc.) shall be provided to prevent access to the system by unauthorized persons;

8. Enclosure shall be new and shall comply with all applicable federal, state and municipal safety codes;

9. The Contractor shall provide all required safety equipment such as fire extinguishers, eyewash, first aid kit, etc;

10. Structural features (doors, floors, openings, etc.) shall be insulated in accordance with the New York State Energy Conservation Construction Code;

11. Engineering noise attenuating controls shall be provided for the enclosure. These controls shall ensure the reduction of noise levels by 50 dBA from within the enclosure to outside the enclosure.

12. The Contractor shall provide and ventilation, insulation and soundproofing. Ventilation and air conditioning shall be sized to prevent equipment overheating.

13. The Contractor shall provide, and install all utilities including electric, in accordance with New York State and local codes;

14. All doors shall be weatherproofed, soundproofed, and lockable;

15. Utilities shall be supplied to enclosure by underground conduit when possible. Other types of feeder must be approved by CM.

16. Enclosure shall be by West Chester Manufacturing, Inc. or Authority-approved equal

G. APPROVED MANUFACTURERS

1. Blowers shall be:

Model EN909BD72WL

as manufactured by:

ROTRON

or Authority-approved equal.

2. In-Line Filter shall be:

Model F65V-8, 8", w/ paper filter

as manufactured by:

Solberg

or Authority-approved equal.

3. Inlet Dilution Filter

Model FS-235P-400F 4", w/ poly filter

as manufactured by:

Solberg

or Authority-approved equal

4. Vacuum Gauge/Indicator

   Model WG22914

   as manufactured by:

   Western Gauge

   or Authority-approved equal

5. Air Flow Element

   Model Ds-200-6" W/ Gauge 2001AV

   as manufactured by:

   Dwyer

   or Authority-approved equal

6. Pressure Gauge/Indicator

   Model WG22675

   as manufactured by:

   Western Gauge

   or Authority-approved equal

7. Temperature Indicator

   Model BTB3407D w/ 4" stem

   as manufactured by:

   Dwyer

   or Authority-approved equal

8. Differential Pressure Gauge

   Model 4000 Series Model 2030 w/ adjustable signal flag

   as manufactured by:

   Dwyer

or Authority-approved equal

PART 3 - EXECUTION

3.01 EXAMINATION/INSPECTION

At a minimum, all components of the blower system shall be inspected and approved by the Authority or its approved representative upon completion of installation. Additional inspections, examinations and quality control measures may be required as per manufacturer's recommendation and are the responsibility of the Contractor. The Authority reserves the right to perform additional inspections or quality control tests as deemed necessary by the Authority at any point during the installation process at no additional cost to the Authority.

3.02 INSTALLATION

All components of the blower system shall be installed in accordance with the manufacturer's recommendations.

A. INSTALLATION OF ENCLOSURE

Enclosure shall be set and installed as per manufactures instructions. New enclosure shall be set and fixed to new level concrete pad as per contract drawings. The CM and/or the Authority shall approve location of enclosure prior to installation. See drawing ENV-1 and ENV-7 for location and layout enclosure.

B. INSTALLATION OF 600 CFM BLOWER

1. The blower shall be installed in a water tight, sound proof enclosure on a concrete pad. Following the completion of the active SSDS piping system, the blower and blower accessories shall be connected to the SSDS piping system. See Drawing ENV-1 for location of SSDS piping system, enclosure and connection piping. Contractor shall start up SSDS and demonstrate satisfactory operation, including operation of controls, in the presence of Authority designated representative.

2. Contractor shall permanently support all system components in accordance with Building Code requirements.

3. Perform all required wiring and electrical work for fully-functional system in accordance with Division 16.

4. Install connections for portable pressure gauges on monitoring points as shown on Drawings. Deliver portable gauges with tubing and fittings to Authority designated representatives.

5. Install in-line pressure gauges to allow for replacement with threaded air-tight connections.

C. INSTALLTION OF PRESSURE GAUGES

Pressure gauges shall be portable, install connection to pressure gauge on sampling port pipe.

3.03 PROTECTION

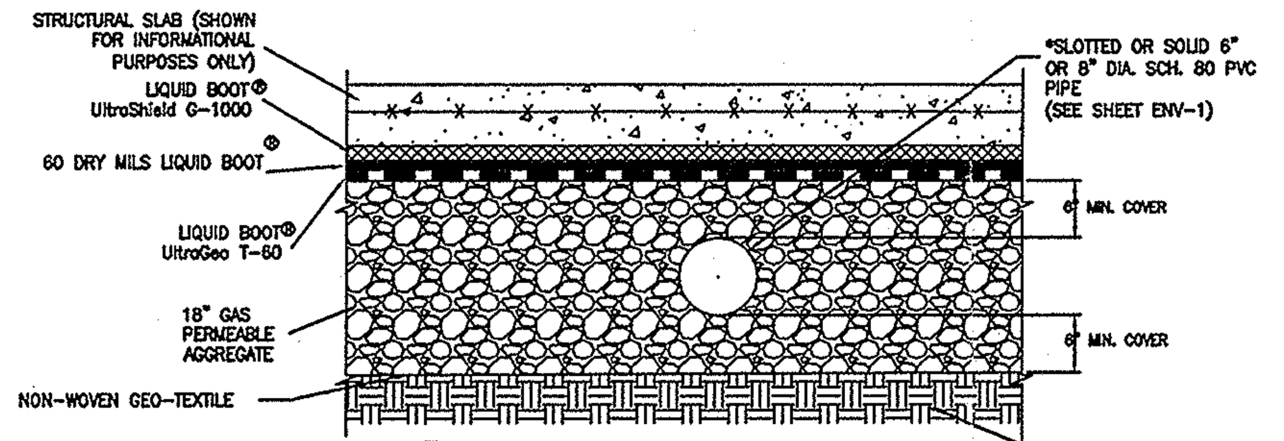
It is the responsibility of the Contractor to ensure that no damage occurs to components of the SSDS or building prior to, during or following installation of blower system, or during any subsequent performance of construction for the facility as identified on the Contract Documents and Drawings. Any damages to the SSDS or building during performance of the Work shall be repaired and tested at no additional cost to the Authority.

END OF SECTION

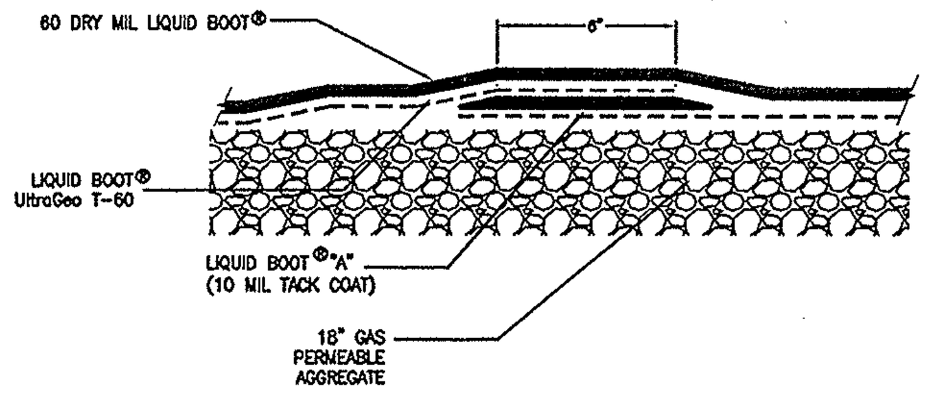
LIST OF SUBMITTALS

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Product Data:		
1. Mfs's product data for 600 CFM Blower.		
2. Mfs's product data for Enclosure.		
3. Shop drawings showing Enclosure piping and equipment layout, location and clearance requirements for blower, equipment and proposed connection to inlet and outlet vent risers.		
4. Electrical Power and Control Schematic Diagrams and Hardware		
5. Mfs's product data and directions for portable pressure guages.		
6. Concrete Pad details and location		
7. Inline filter, Dilution Filter Vacuum Gauges, Pressure Gauges, Differential Gauges, Flow Element, Vacuum Relief Valve, Temperature Indicator		

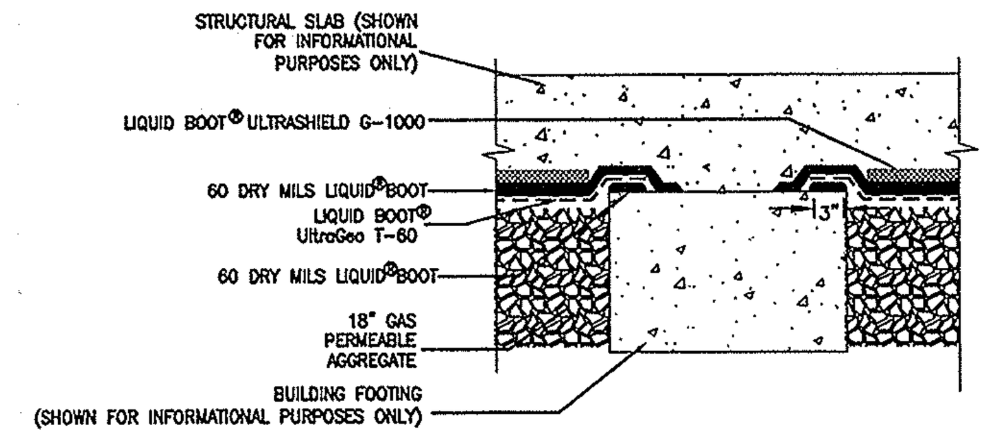
END OF SECTION



A / ENV-2 TYPICAL SUBGRADE PIPING DETAIL
NOT TO SCALE

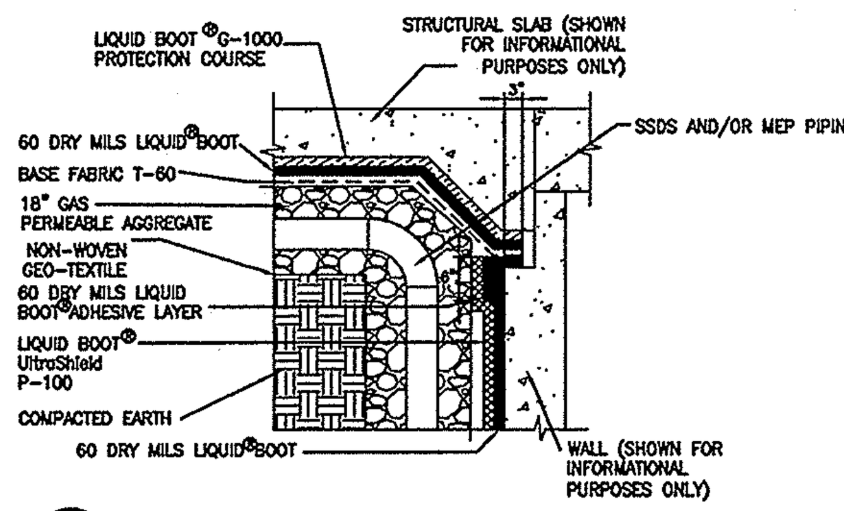


B / ENV-2 GAS VAPOR BARRIER LAP JOINTS ON GEOTEXTILE
NOT TO SCALE



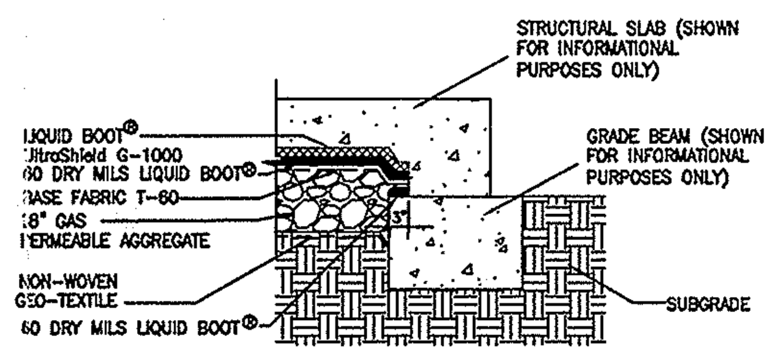
C / ENV-2 GAS VAPOR BARRIER FOOTINGS AND GRADEBEAMS
NOT TO SCALE

NOTE: BRING THE MEMBRANE ONTO THE FOOTING, THE GEOTEXTILE IS THEN ENCAPSULATED IN THE MEMBRANE.



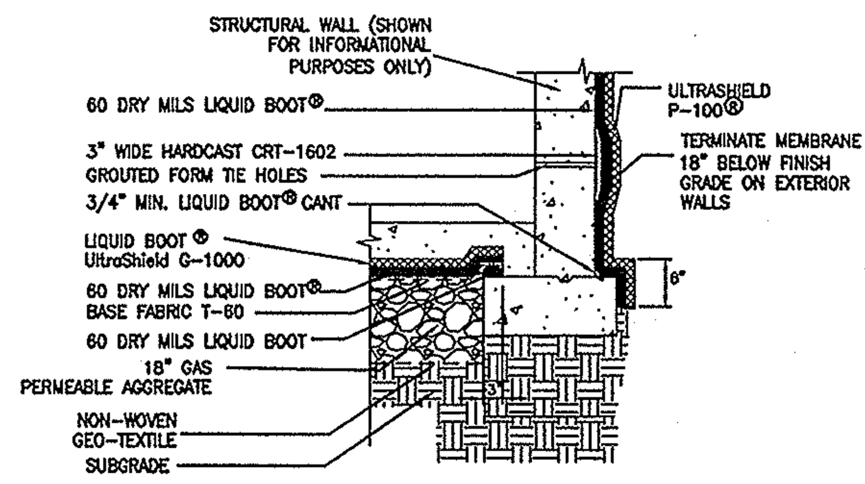
D / ENV-2 GAS VAPOR MEMBRANE SLAB ON GRADE TO FOUNDATION WALL TRANSITION
NOT TO SCALE

NOTE: BRING THE MEMBRANE 6" ONTO THE EXISTING WALL MEMBRANE

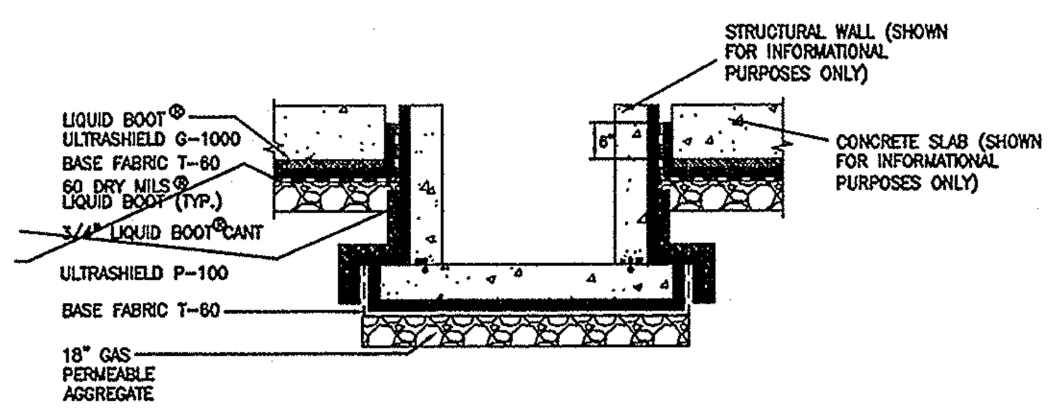


E / ENV-2 GAS VAPOR BARRIER OVER FOOTINGS & GRADE BEAMS
NOT TO SCALE

NOTE: BRING THE MEMBRANE 3" ONTO THE FOOTINGS THE GEOTEXTILE IS THEN ENCAPSULATED IN THE MEMBRANE

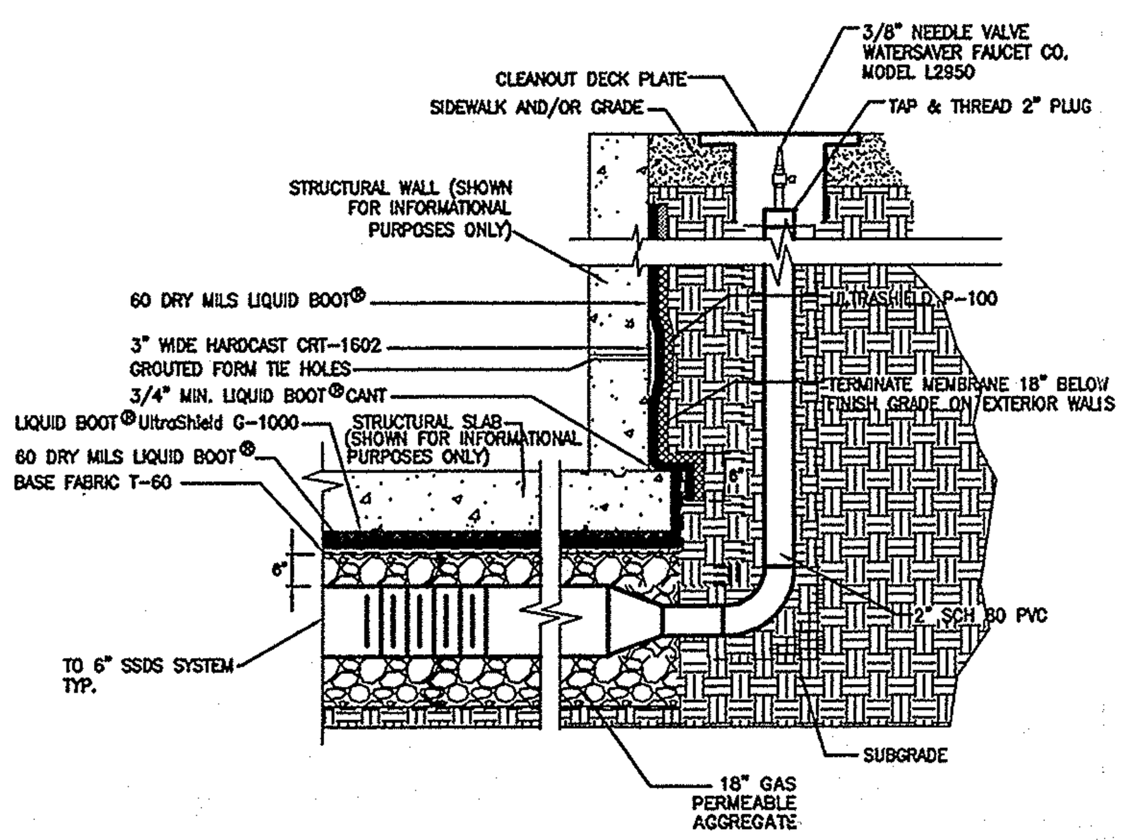


F / ENV-2 GAS VAPOR BARRIER UNDERSLAB & WALLS WITH FOOTINGS
NOT TO SCALE

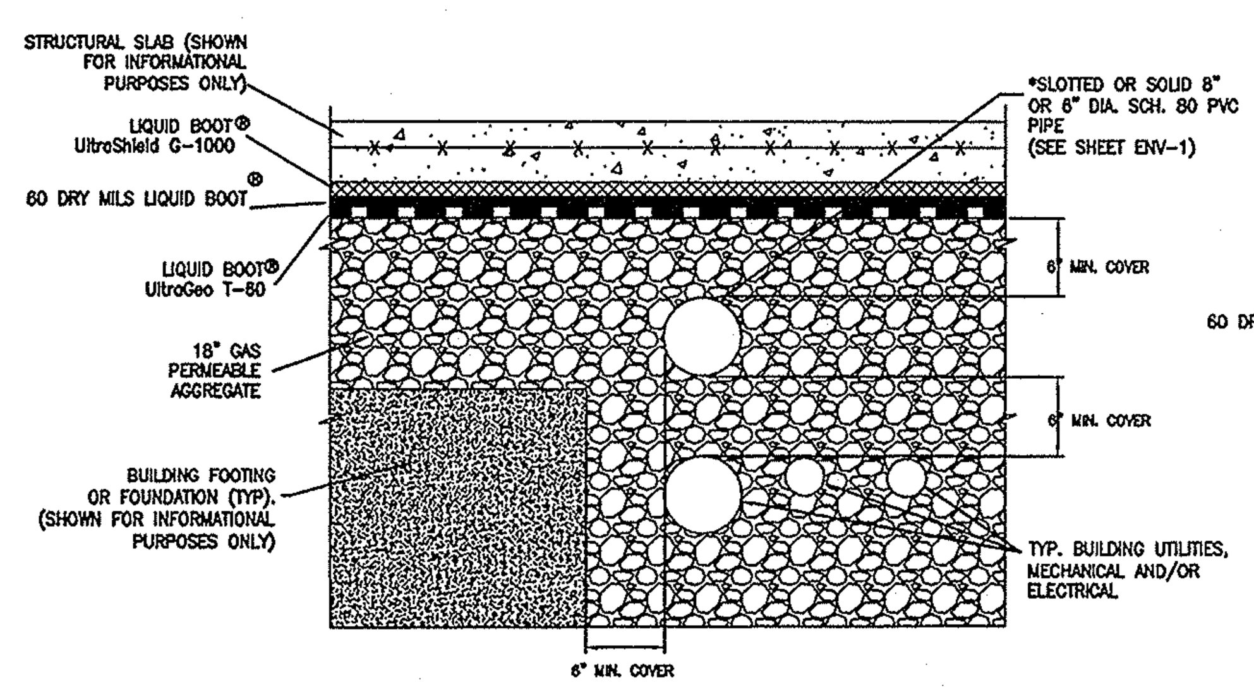


G / ENV-2 TYPICAL DETAIL AT ELEVATOR PIT/GREASE TRAP AND SEWAGE EJECTOR PITS
NOT TO SCALE

NOTE: BRING THE MEMBRANE 6" ONTO THE EXISTING WALL MEMBRANE

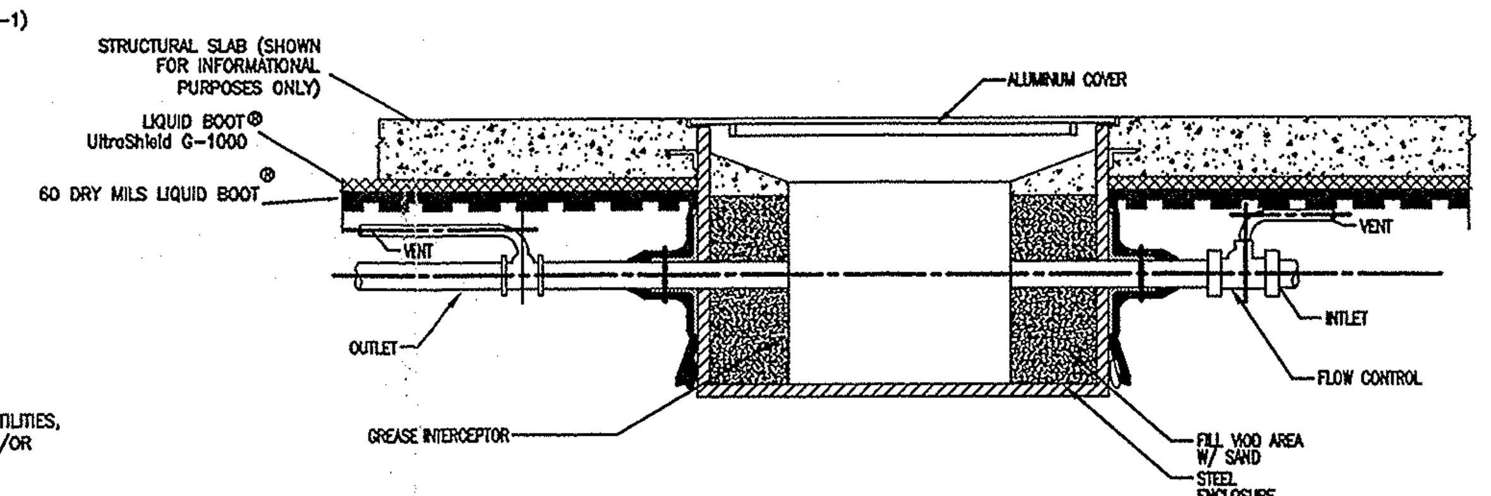


H / ENV-2 TYPICAL SAMPLING PORT
NOT TO SCALE



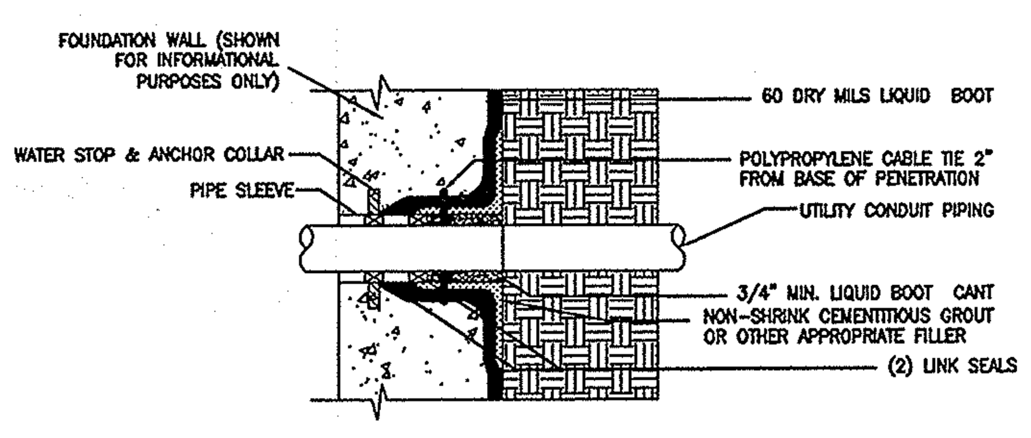
NOTE: THIS SSDS SYSTEM IS TO BE INSTALLED AT A ELEVATION OF 6" BELOW NEW BUILDING SLAB ON GRADE. THE SSDS SYSTEM MAY BE ALTERED (+/- 12") IN FIELD TO ACCOMMODATE UNFORESEEN FIELD CONDITIONS THERE WITH NEW BUILDING MECHANICAL AND ELECTRICAL UTILITIES COORDINATION

I / ENV-2 TYPICAL SUBGRADE PIPING DETAIL
NOT TO SCALE

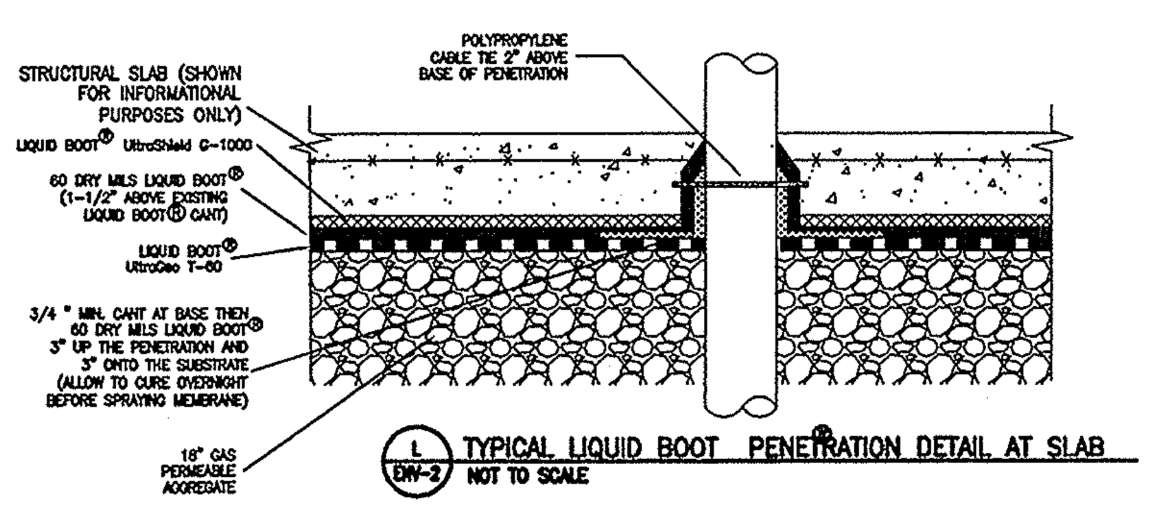


J / ENV-2 GREASE INTERCEPTOR IN STEEL ENCLOSURE
NOT TO SCALE

NOTE: GREASE INTERCEPTOR DETAILS ARE ON ARCHITECT DRAWINGS.

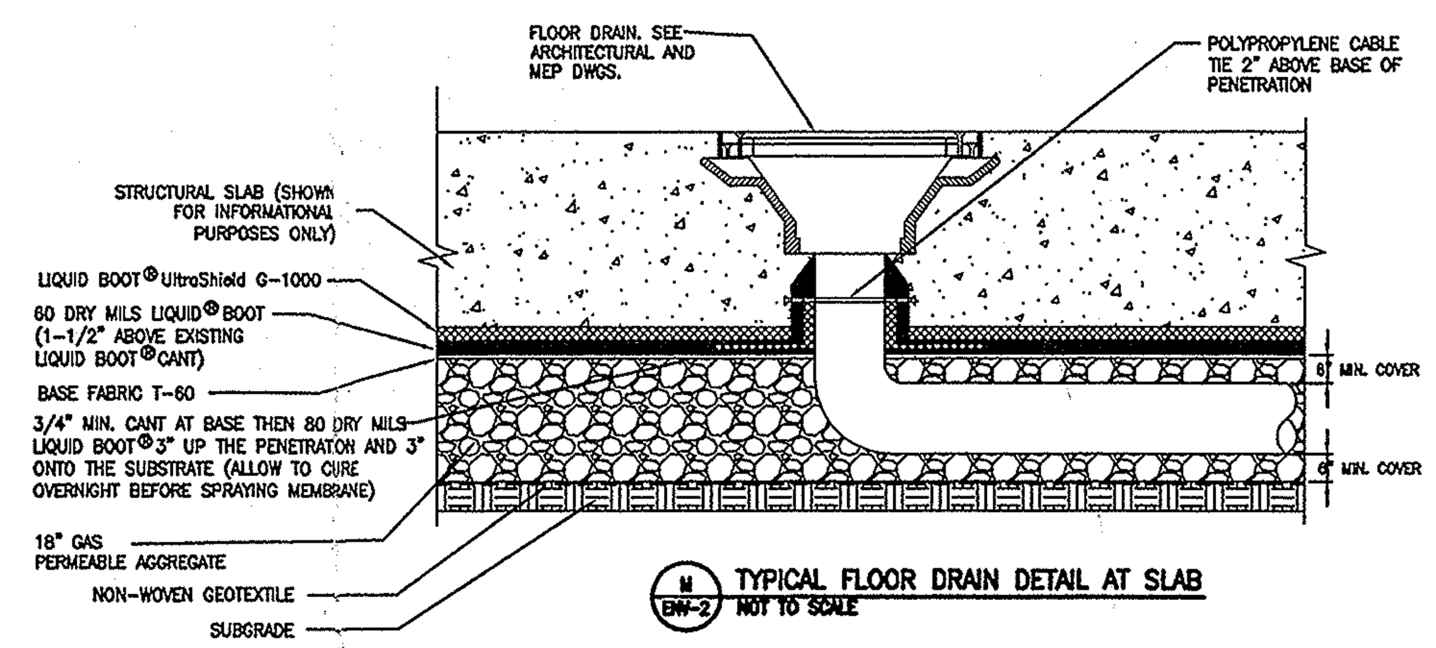


K / ENV-2 CONDUIT PENETRATION FOUNDATION WALL
NOT TO SCALE



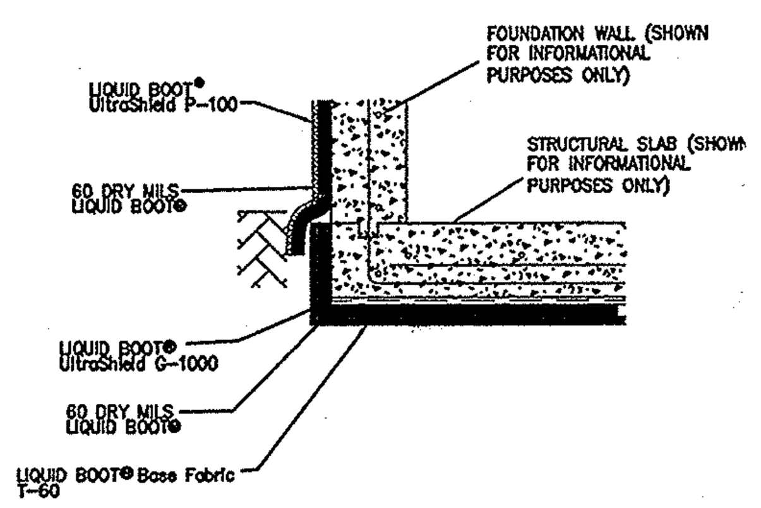
L / ENV-2 TYPICAL LIQUID BOOT PENETRATION DETAIL AT SLAB
NOT TO SCALE

NOTE: FOR INFORMATIONAL PURPOSES. CONTRACTOR TO SUPPLY SHOP DRAWINGS OF PROPOSED METHOD FOR APPROVAL. ALL PENETRATIONS SHALL BE CLEANED PER SPECIFICATIONS BEFORE LIQUID BOOT® IS APPLIED.

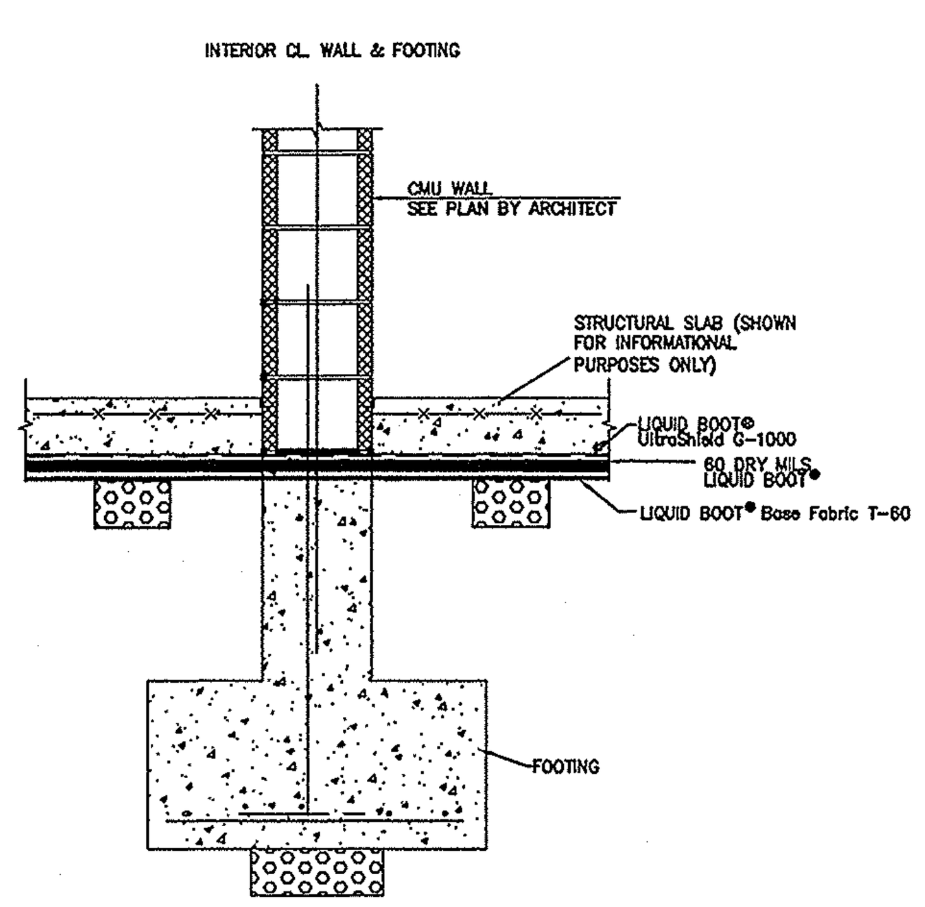


M / ENV-2 TYPICAL FLOOR DRAIN DETAIL AT SLAB
NOT TO SCALE

NOTE: ALL PENETRATIONS SHALL BE CLEANED PER SPECIFICATIONS BEFORE LIQUID BOOT® IS APPLIED.



N / ENV-2 GRADE BEAM/ FOUNDATION WALL DETAIL
NOT TO SCALE



O / ENV-2 TYPICAL CMU BEARING WALL CONTINUOUS FOOTING DETAIL AT NEW SLAB ON GRADE
NOT TO SCALE

THIS DRAWING NOT TO BE USED AS STRUCTURAL OR OTHER REFERENCE EXCEPT SSDS SYSTEM.

GENERAL NOTES:

1. IF A CONFLICT ARISES BETWEEN THE SSDS PIPING AND STRUCTURAL AND/OR MEP ELEMENTS OF THE BUILDING, THE SSDS PIPING CAN BE RE-ALIGNED HORIZONTALLY OR VERTICALLY 12" +/- AS NECESSARY TO AVOID THE CONFLICT. MAINTAIN AT LEAST 6-INCHES OF GRAVEL ABOVE AND BELOW THE SSDS PIPING.
2. GAS VAPOR BARRIER COMPONENTS MAY BE MANUFACTURED BY LIQUID BOOT OR AS SHOWN, OR AN OWNER REPRESENTATIVE APPROVED EQUAL.
3. SEE SPECIFICATION SECTION 02221

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

Architecture & Engineering

Shaw™ Environmental, Inc.
One Penn Plaza, 250 West 34th Street, 7 Floor
New York, NY 10119
T: 212.290.6000 F: 212.290.7094

No.	Date:	Revision:

KEY PLAN:

BLOCK #: LOT #:

SCA Design Manager:	S. Crociata
Principal In Charge:	A. Arriga
Project Architect/Engineer:	A. Arriga
Designer:	S. Morse/E. Faccioli
Drawn by:	R. Togolf
Checked by: 3-28-07 SHAW ISSUE	S. Morse/E. Faccioli

LLW NO.'S: | FACILITY CODE: | DATE: 04-02-07

PROJECT:
METROPOLITAN AVE. SCHOOLS
1000 STUDENT HS
700 STUDENT IS/HS
LLW# 007186, LLW# 012545

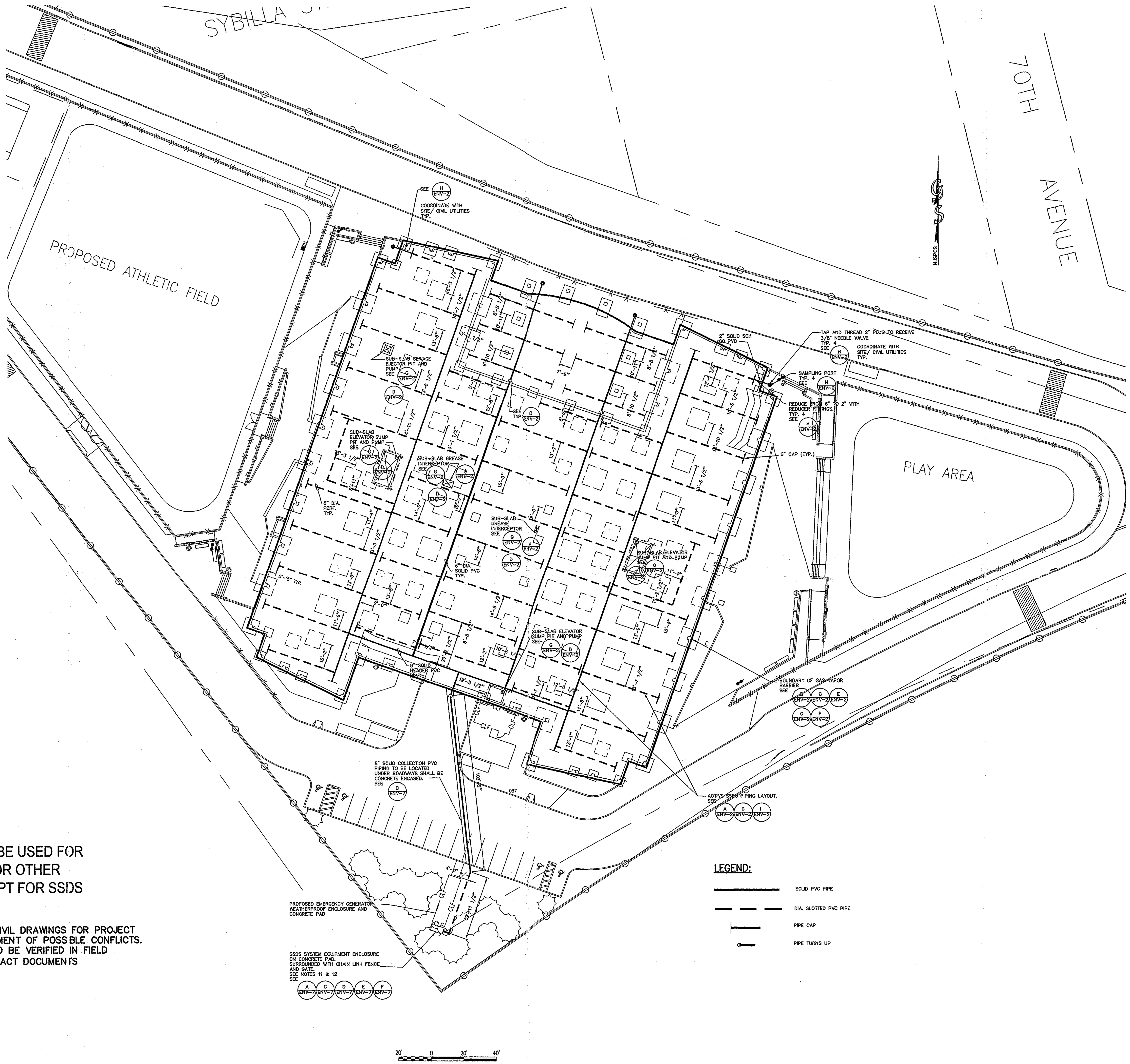
DRAWING TITLE:
SUB-SLAB DEPRESSURIZATION SYSTEM PIPING AND GAS VAPOR BARRIER DETAILS

DRAWING NO.: ENV-2

SHEETS IN CONTRACT: 479 OF 484

NOTES (ENV-1 & ENV-2):

1. THE SURFACES TO BE LINED SHALL BE FREE OF ALL ROCKS, STONES, STICKS, ROOTS, SHARP OBJECTS, OR CONSTRUCTION DEBRIS OF ANY KIND. NO STANDING WATER, EXCESSIVE MOISTURE OR FROZEN GROUND SHALL BE ALLOWED.
2. AGGREGATE BACKFILL MUST BE ROLLED FLAT AND NON-ANGULAR.
3. UNDERSLAB GAS VAPOR COLLECTION PIPING SHALL BE CONSTRUCTED OF SCHEDULE 80 PVC, SLOTTED CASINGS WITH 0.03 INCH SLOTS AND SOLID PIPING AS INDICATED IN DRAWING. SLOTTED AND SOLID PIPE ENDS TO BE CAPPED BY SOLVENT WELD.
4. SLOTTED AND SOLID GAS VAPOR COLLECTION PIPING SHALL BE 6" DIAMETER.
5. ALL HORIZONTAL SOLID PIPING SHOULD MAINTAIN A MINIMUM SLOPE OF 1/8" PER FOOT IN ORDER TO DRAIN CONDENSATION BACK TO SOIL BENEATH THE VAPOR BARRIER. THE SYSTEM SHOULD BE INSTALLED SO THAT NO PORTION WILL ALLOW EXCESS ACCUMULATION OF CONDENSATION.
6. USE GRAY HEAVY BODIED CEMENT FOR ALL GLUED PVC JOINTS.
7. IF A CONFLICT ARISES BETWEEN THE SSDS PIPING AND STRUCTURAL, ARCHITECTURAL OR MEP ELEMENTS OF THE BUILDING, THE SSDS PIPING CAN BE RE-ALIGNED UP TO 12" IN ANY DIRECTION (HORIZONTALLY OR VERTICALLY) AS NECESSARY TO AVOID THE CONFLICT. MAINTAIN AT LEAST 6-INCHES OF GRAVEL ABOVE AND BELOW THE SSDS PIPING.
8. ALL PROPOSED PIPING/TRENCH LOCATIONS TO BE CONFIRMED AND APPROVED BY THE AUTHORITY OR AUTHORITY'S FIELD REPRESENTATIVE DURING THE TIME OF CONSTRUCTION.
9. TESTING PROCEDURES: CONTRACTOR SHALL PRESSURE TEST THE RUN OF UNDERGROUND SOLID PIPING CONNECTING SYSTEM HEADER AND VENT STACKS. TEMPORARILY PLUG PIPING AT HEADER CONNECTIONS AND TOP OF STACKS AND PRESSURIZE PIPING TO 10 PSIG WITH AIR. SOAP ALL JOINTS AND MONITOR PRESSURE GAUGE FOR 30 MINUTES MINIMUM WITHOUT LOSS IN PRESSURE. REPAIR LEAKS AND RETEST AS NECESSARY. PRESSURE TESTING SHALL BE PERFORMED IN ACCORDANCE WITH SPECIFICATION SECTION 02221, ARTICLE 3.01 B.
10. THE UNDERGROUND HEADER LINE SHALL TURN UP TOWARDS GROUND SURFACE JUST SOUTHWEST OF THE BUILDING FOOTPRINT TO A DEPTH OF 3'-6" BELOW GRADE AND THEN CONTINUE TO RUN AS SHOWN ON ENV-1 TOWARDS THE FINAL BLOWER ENCLOSURE AND VENT STACK LOCATION. REFER TO ENV-2 AND ENV-7 FOR TYPICAL PIPING AND RISER DETAILS.
11. CONTRACTOR TO VERIFY THAT VENT STACK EXHAUST LOCATION ARE A DISTANCE OF 25 FEET OR MORE FROM ANY AIR INLETS. FINAL LOCATION AND HEIGHT OF VENT STACKS SHALL BE IN ACCORDANCE WITH NEW YORK CITY BUILDING CODE. SEE ARCHITECTURAL DRAWINGS FOR DECORATIVE TREATMENT OF VENT STACK.
12. VENT STACK SHALL BE SECURELY ANCHORED WITH ADEQUATE STRUCTURAL SUPPORTS, SEE ARCHITECTURAL DRAWINGS FOR DETAILS.
13. MANUFACTURER OF FLUID APPLIED GAS VAPOR BARRIER SHALL BE LIQUID BOOT OR AUTHORITY APPROVED EQUAL.
14. GAS VAPOR BARRIER IS APPLIED TO ENTIRE FOOTPRINT OF BUILDING AND ALONG EXTERIOR SUBSURFACE WALLS.
15. REFER TO DETAILS ON ENV-2 FOR SPECIFIC LIQUID BOOT TERMINATION DETAILS.
16. CONTRACTOR TO SUBMIT SSDS BUILDING SYSTEM, SSDS SITE PIPE ROUTING, SSDS BLOWER, SSDS BLOWER ENCLOSER, SSDS BLOWER ENCLOSER PIPING LAYOUT FOR APPROVAL PRIOR TO INSTALLATION.
17. SSDS CONTRACTOR TO COORDINATE WITH ALL SITE/CIVIL WORK, GENERAL CONTRACTOR AND ANY AND ALL TRADES PRIOR TO SHOP DRAWING AND/OR INSTALLATION.
18. PROVIDE ALL ELECTRICAL POWER WIRING, CONTROL WIRING, DEVICES, APPURTENANCES, AND ASSOCIATED ELECTRICAL WORK REQUIRED FOR THE OPERATION OF THE SYSTEM AND EQUIPMENT AS PER THE CONTRACT DOCUMENTS. ALL ELECTRICAL WORK SHALL CONFORM TO ALL REQUIREMENTS OF THE NATIONAL ELECTRIC CODE AND GOVERNING SECTIONS OT THE NEW YORK STATE ELECTRICAL CODES AND ALL AUTHORITES HAVING JURISDICTION. ALL EQUIPMENT TO BE UL APPROVED.



DRAWING NOT TO BE USED FOR STRUCTURAL OR OTHER REFERENCE EXCEPT FOR SSDS

REFERENCE PROJECT SITE/CIVIL DRAWINGS FOR PROJECT COORDINATION AND ASSESSMENT OF POSSIBLE CONFLICTS. ALL SSDS ROUTING WORK TO BE VERIFIED IN FIELD AND/OR WITH OTHER CONTRACT DOCUMENTS

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

Sharon L. Greenberger, MCP, President and C.E.O

Architecture & Engineering

E. Bruce Barrett, R.A., Vice President
George Roussey, PE, Senior Director Technical Standards Studio
Elon R. Abneri, P.E., Director of Design Studio 1
Timothy F. Ng, R.A., PP. Director of Design Studio 2
Gary Deane, Director of Operations, Special Projects

Shaw™ Environmental, Inc.

One Penn Plaza, 250 West 34th Street, 7 Floor
New York, NY 10119
T: 212.290.6000 F: 212.290.7094

No.	Date:	Revision:

KEY PLAN:

BLOCK #: LOT #:

SCA Design Manager:	S. Crociata
Principal in Charge:	A. Arrigo
Project Architect/Engineer:	A. Arrigo
Designer:	S. Morse/E. Faccioli
Drawn by:	R. Tagoff
Checked by: 3-28-07 SHAW ISSUE	S. Morse/E. Faccioli

LLW NO.'S:	FACILITY CODE:	DATE:
		04-02-07

PROJECT:

METROPOLITAN AVE. SCHOOLS

1000 STUDENT HS
700 STUDENT IS/HS
LLW# 007186, LLW# 012545

DRAWING TITLE:

SUB-SLAB DEPRESSURIZATION SYSTEM - SSDS

DRAWING NO.: ENV-1

SHEETS IN CONTRACT: 478 OF 484

INSTRUMENT INDEX

P&ID Tag	Location	Description	Stream	Flow	Inlet/Outlet	Capacity	Material	Manufacturer and Model
VI	See DWG'S	Vacuum Indicator	Air	NA	4 inch	-30" VAC	Brass	Western Gauge Model WG22914 or approved equal
FE	Air Discharge Stack	Air Flow Element (See Note 2)	Air	600 CFM	1/2 inch	100-1000 CFM 3000 FPM	SS	Dwyer Instruments DS Series Flow Sensor Model ds-200-8" w/ Gauge Model 2001AV scale or approved equal
PI	Blower Discharge Piping	Pressure Indicator	Air	600 CFM	1/4 inch	0-10" W.C.	Brass	Western Gauge Model WG22675 or approved equal
TI	Blower Discharge Piping	Temperature Indicator	Air	600 CFM	1/2 Inch	50-500°F	SS	Dwyer Instruments Model BTB3407D with 4" stem or approved equal
PDI	Across In-Line Filter	Differential Pressure Indicator	Air	600 ACFM	1/4 Inch	0-30" W.C.	AL	Dwyer Capsuhelic 4000 Series Model 2030 with adjustable signal flag or approved equal

BLOWER SCHEDULE

P&ID No. or Item	Description	Stream	Flow	TDH	Inlet/Outlet Size	Motor	Mat'l. of Construction	Manufacturer and Model
F-1	IN-LINE FILTER, FLANGE	AIR	600 CFM	10"	8"/8"	NA	Carbon Steel	SOLBERG MODEL F65V-8 PAPER or Approved Equal
B-1	Ametek Blower	Air	600 CFM	10" W.C Vacuum at Blower Inlet	4"/4"	10 HP	Carbon Steel CORROSION RESISANT	EG&G ROTRON EN909BD72WL or Approved Equal
F-2	INLET FILTER/SILENCER	Air	300 CFM	NA	4"	NA	Carbon Steel	SOLBERG MODEL FS-235P-400F POLY FILTER or Approved Equal

INSTRUMENT IDENTIFICATION TABLE

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
F	FLOW RATE	RATIO			
G	GAUGING (DIMENSIONAL)		GLASS		
H	HAND (MANUAL)				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
P	PRESSURE		POINT (TEST)		
T	TEMPERATURE			TRANSMIT	
V	VACUUM			VALVE OR DAMPER	

NOTES:

1. PROVIDE PRESSURE SNUBBERS (DWYER SERIES PS MODEL PS124) ON ALL VACUUM INDICATORS.
2. AIR FLOW METERS MUST BE INSTALLED IN A STRAIGHT RUN OF PIPE (10 PIPE DIAMETERS UPSTREAM AND 5 PIPE DIAMETERS DOWNSTREAM OF METERS).
3. SEE SPECIFICATION SECTION 15880 FOR FURTHER INFORMATION ON SSDS SYSTEM AND ACCESSORIES.
4. CONTRACTOR TO PROVIDE CONNECTION IN SSDS MOTOR STARTER/ CONTROL PANEL FOR NEW BUILDING BMS SYSTEM.

VALVE, PIPING AND EQUIPMENT SYMBOLS

BALL VALVE (NORMALLY CLOSED)

VACUUM OR PRESSURE RELIEF VALVE

BLOWER

REDUCER

FLANGE CONNECTION

FILTER

GENERAL INSTRUMENT AND CONTROL SYMBOLS

LOCALLY MOUNTED

PANEL MOUNTED

PANEL INDICATOR LIGHT

LINE SYMBOLS

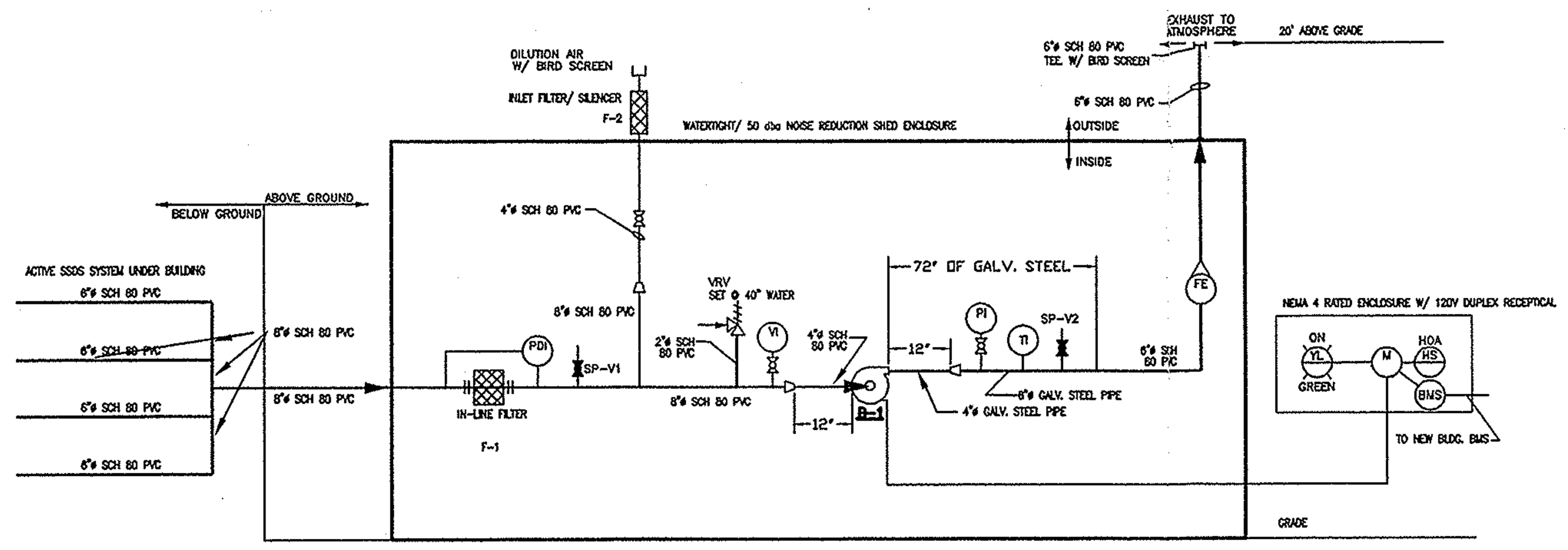
PROCESS PIPES OR CHANNELS

CONNECTION TO PROCESS, MECHANICAL LINK OR INSTRUMENT SUPPLY

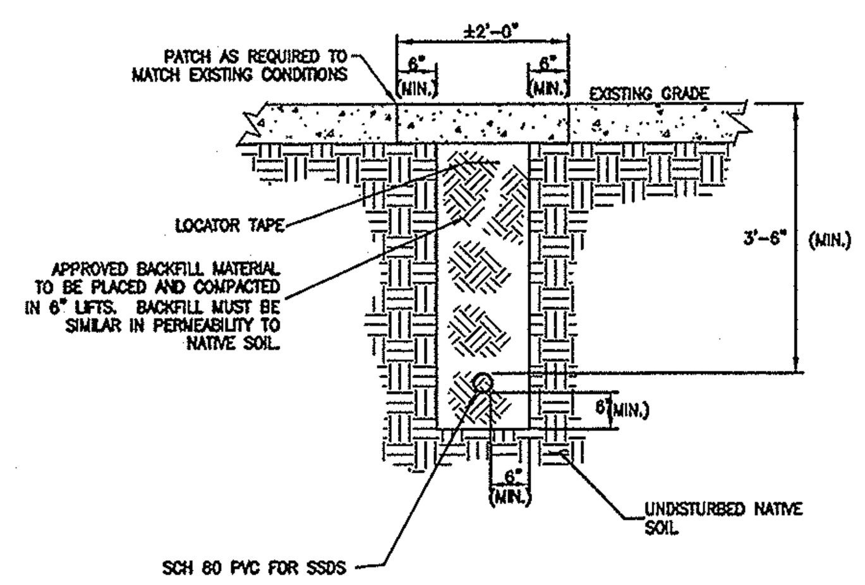
ELECTRIC SIGNAL

ABREVIATIONS USED:

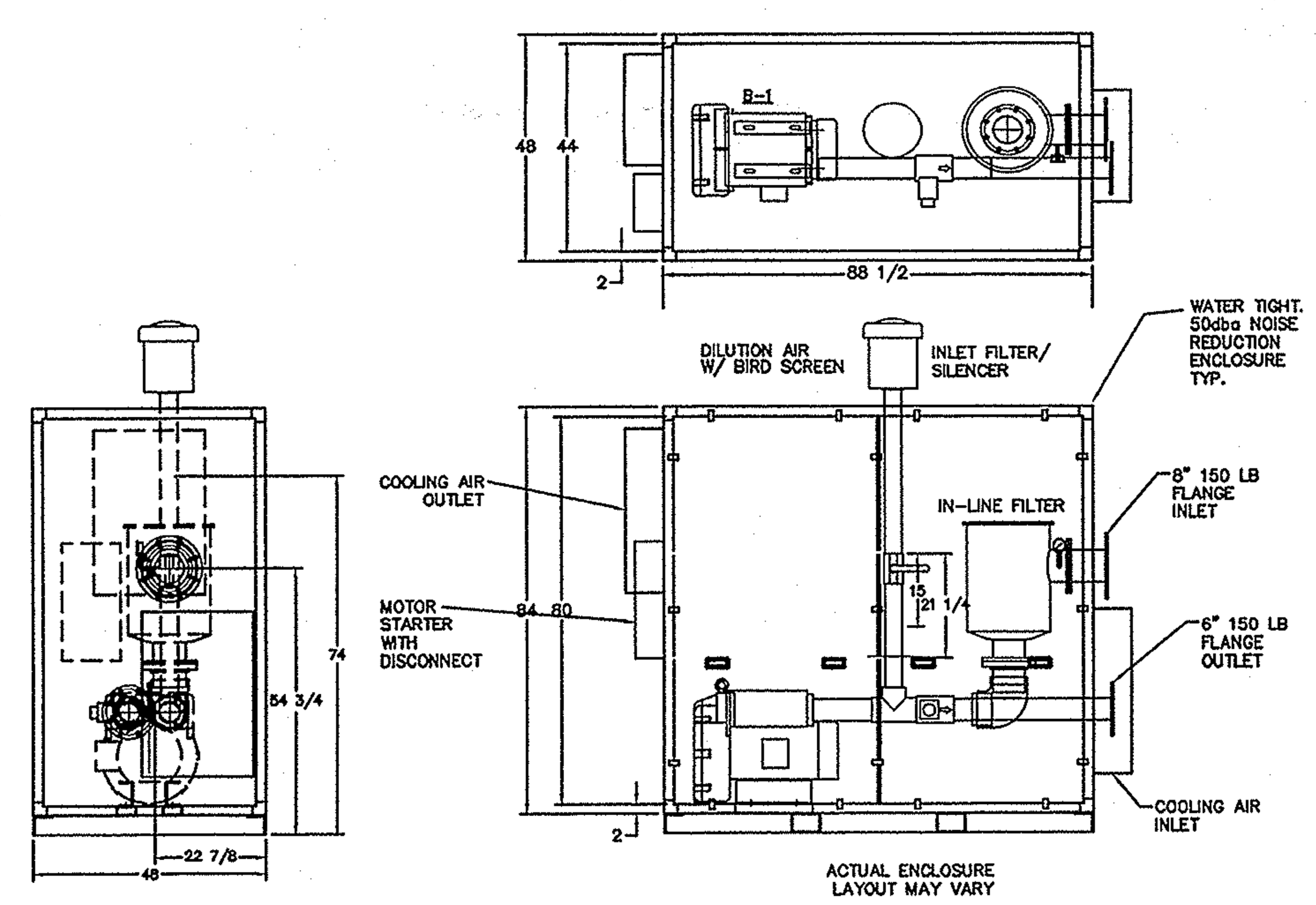
SSDS = SUB SLAB DEPRESSURIZATION SYSTEM
SVE = SOIL VAPOR EXTRACTION
PVC = POLYVINYL CHLORIDE
SP = SAMPLE PORT
CS = CARBON STEEL
SCH = SCHEDULE
GPA = GAS PERMEABLE AGGREGATE



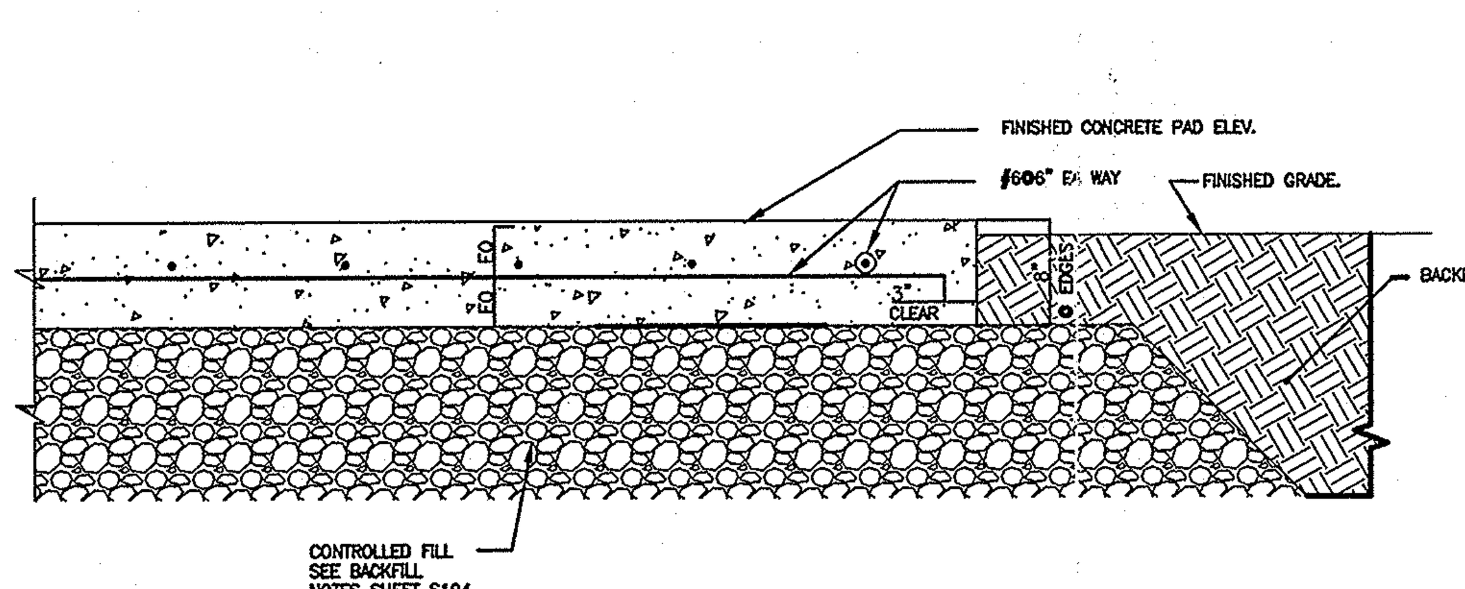
A P&ID
ENV-7 NOT TO SCALE



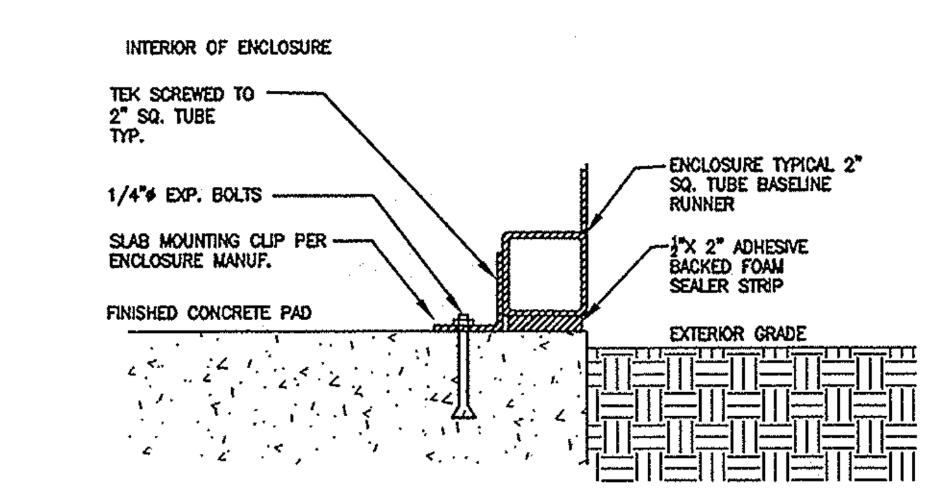
B TRENCHING DETAIL
ENV-7 NOT TO SCALE



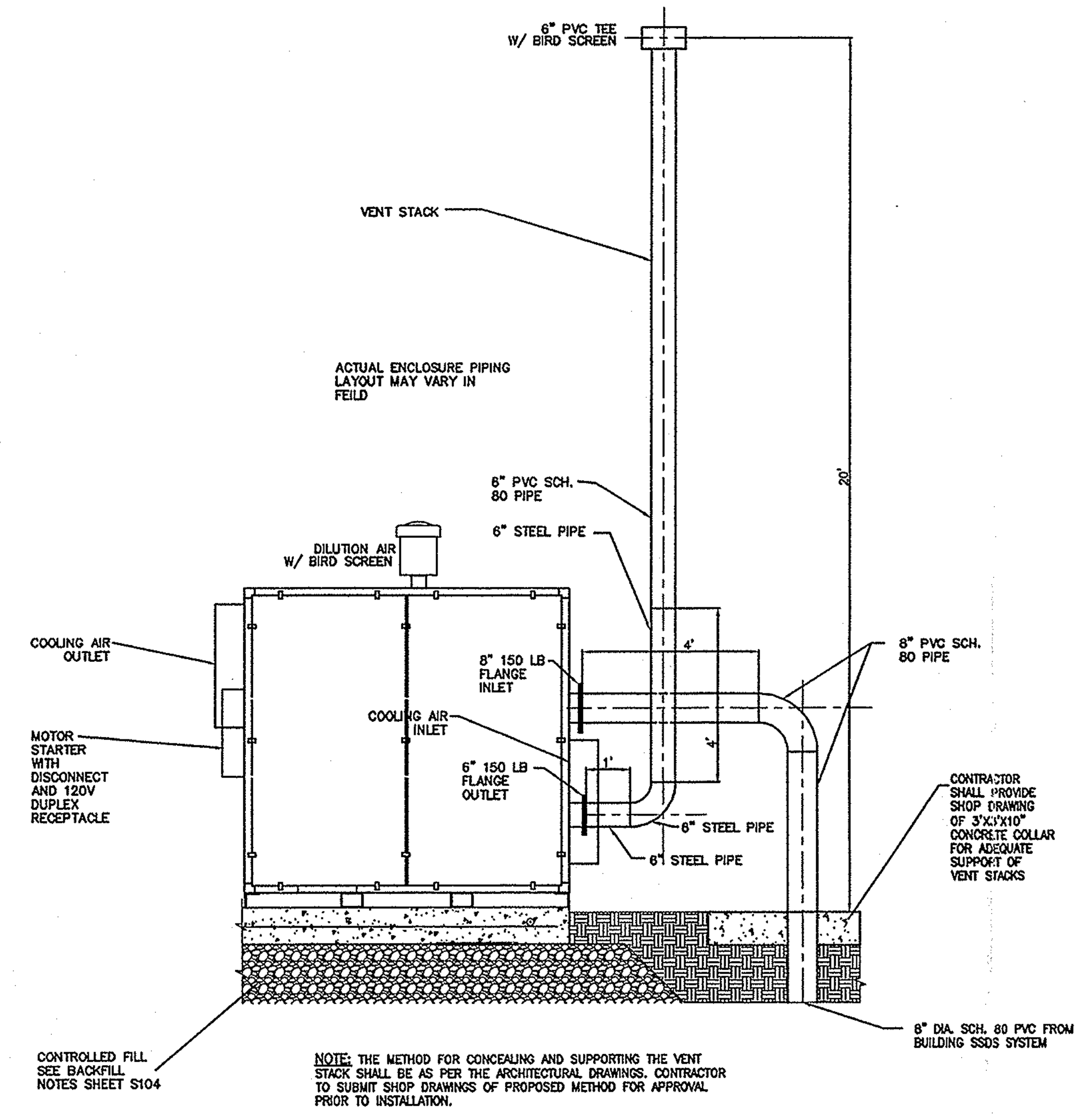
C SSDS BLOWER ENCLOSURE LAYOUT
ENV-7 NOT TO SCALE



D CONCRETE SLAB DETAIL
ENV-7 NOT TO SCALE



E ENCLOSURE MOUNTING DETAIL
ENV-7 NOT TO SCALE



F SSDS BLOWER ENCLOSURE AND PIPING ELEVATION
ENV-7 NOT TO SCALE

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

Architecture & Engineering

Shaw™ Environmental, Inc.

One Penn Plaza, 250 West 34th Street, 7 Floor
New York, NY 10119
T: 212.290.6000 F: 212.290.7094

No.	Date:	Revision:

KEY PLAN:

BLOCK #: LOT #:

SCA Design Manager:	S. Crociata
Principal In Charge:	A. Arrigo
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Designer:	S. Morse/E. Faccioli
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Checked by: 3-28-07 SHAW ISSUE	S. Morse/E. Faccioli

LLW NO.'S:	FACILITY CODE:	DATE:
		04-02-07

PROJECT:

METROPOLITAN AVE. SCHOOLS

1000 STUDENT HS
700 STUDENT IS/HS
LLW# 007186, LLW# 012545

DRAWING TITLE:

ACTIVE SSDS P&ID AND LAYOUT

DRAWING NO.: ENV-7

SHEETS IN CONTRACT: 484 OF 484

APPENDIX I

CD WITH SITE SUMMARY INFORMATION

Metropolitan Avenue School Site
87-01 69th Street
92-34 Metropolitan Avenue
Forest Hills, New York 11375
Site Summary

The Metropolitan Avenue School Site is located at 87-01 69th Street and 92-34 Metropolitan Avenue in Forest Hills, Queens County, New York. The Site formerly contained a food distribution facility for HJ Heinz Company, a lumber yard for All-County Lumber, and a coal supply company. Chemicals from previous Site operations of HJ Heinz Company contaminated groundwater at the Site. To remediate the groundwater contamination an air sparging/soil vapor extraction (AS/SVE) system was constructed and operated from 2005 - 2007. Site groundwater has been remediated in accordance with the remedial action objectives (RAOs).

As part of the school construction activities which began in 2007, a cover system consisting of asphalt-covered areas, concrete covered areas and athletic surfaces and turf was constructed. In addition, a vapor barrier and sub slab depressurization system (SSDS) were installed beneath the concrete slab of the school building. There is no active, ongoing remediation at the Site. A groundwater monitoring program has been implemented to document natural attenuation of residual contamination in Site groundwater.

A Site Management Plan (SMP) has been implemented by the Site owner, the New York City School Construction Authority (NYCSCA) to ensure that the integrity of the cover system, vapor barrier and SSDS are maintained.

A copy of the Environmental Easement for the Site is included with this Site Summary. Questions regarding the requirements of the Environmental Easement should be referred to the Owner.

APPENDIX J

SSDS INSPECTION FORM/CHECK LIST

SSDS Inspection Form/Checklist

Metropolitan Avenue Site
87-01 69th Avenue and 92-34 Metropolitan Avenue, Forest Hills, New York 11375

Inspector's Name:	Weather Conditions:
Company Name:	Air Temperature (°F):
Inspector's Position:	
Inspection Date:	
Inspection Time:	

A. SSDS SYSTEM INSPECTION

1. Walk the entire roof surface of system enclosure shed and inspect interior of shed.

1.1 Rust or other debris in the vicinity of the post, sleeve and discharge cap at the SSDS stack vent?
_____**Yes** (Explain below in Comments Section) _____No

1.2 Rust or other debris in the vicinity of the inline filter/bird screen?
_____**Yes** (Explain below in Comments Section) _____No

1.3 SSDS blower unit functioning properly and spare blower unit available?
_____Yes _____**No** (Explain below in Comments Section)

1.4 The inline filter differential pressure gauge functioning properly?
_____Yes _____**No** (Explain below in Comments Section)

1.5 Blower inlet vacuum indicator functioning properly?
_____Yes _____**No** (Explain below in Comments Section)

1.6 Blower outlet pressure gauge and temperature gauge functioning properly?
_____Yes _____**No** (Explain below in Comments Section)

1.7 Discharge flow element functioning properly?
_____Yes _____**No** (Explain below in Comments Section)

1.8 Dilution air intake functioning properly?
_____Yes _____**No** (Explain below in Comments Section)

1.9 Indicator lights on the BMS panel functioning properly?
_____Yes _____**No** (Explain below in Comments Section)

* Comments:

B. BASEMENT INSPECTION

2. Walk the entire basement floor

2.1 Any visible cracks in the basement floor? _____**Yes** (See 2.4, 2.5, 2.6) _____No

2.2 Any visible cracks in the basement wall?_____**Yes** (See 2.4, 2.5, 2.6) _____No

2.3 Any other visible openings (unintended) in floor or walls?_____**Yes** (See 2.4, 2.5, 2.6) _____No

2.4 Draw approximate location of floor and/or wall cracks/openings on site map.

2.5 Note the length of the crack/opening:

2.6 Note the width of the crack/opening.

* Comments:

Inspector's Signature: _____

APPENDIX K

WELL CONSTRUCTION LOGS FOR GROUNDWATER MONITORING WELL NETWORK

IT CORPORATION
A Member of The IT Group

Drilling Log

Monitoring Well SCA-10S

Project: SCA Metropoliten Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 80.0 ft. | North: -45948.65 ft. | East: 43475.74 ft.
Top of Casing: 82.77 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.
Casing: Dia: 2 in. | Length: 65 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling & Testing | Method: Hallow Stem Auger
Driller: C. Stratten | Log By: B. Fritz | Date: 6/13/02 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery / Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0						
10						
20						
30						
40						
50						
60						
70						
80						
90						

IT CORPORATION

Drilling Log

Monitoring Well SCA-11S

Project: SCA Metropoliten Avenue | Owner:

Location: Forest Hills, Queens, New York | Proj. No.: 837411

Surface Elev.: NA | Total Hole Depth: 80.0 ft. | North: -45879.57 ft. | East: 43101.08 ft.

Top of Casing: 75.97 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.

Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.

Casing: Dia: 2 in. | Length: 65 ft. | Type: PVC

Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig

Drill Co.: Aquifer Drilling & Testing | Method: Hallow Stem Auger

Driller: C. Stratten | Log By: B. Fritz | Date: 6/21/02 | Permit #: NA

Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							

IT CORPORATION

Drilling Log

Monitoring Well SCA-11I

Project: SCA Metropoliten Avenue | Owner:

Location: Forest Hills, Queens, New York | Proj. No.: 837411

Surface Elev.: NA | Total Hole Depth: 110.0 ft. | North: -45880.11 ft. | East: 43105.16 ft.

Top of Casing: 75.82 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.

Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.

Casing: Dia: 2 in. | Length: 95 ft. | Type: PVC

Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig

Drill Co.: Aquifer Drilling & Testing | Method: Hallow Stem Auger

Driller: C. Stratten | Log By: B. Fritz | Date: 6/30/02 | Permit #: NA

Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
10							
20							
30							
40							
50							
60							
70							
80							
90							
100							
110							

IT CORPORATION

Drilling Log

Monitoring Well SCA-11D

Project: SCA Metropoliten Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 150.0 ft. | North: -45878.31 ft. | East: 43095.26 ft.
Top of Casing: 76.11 ft. | Water Level Initial: NA | Static: NA | Diameter: 8.5 in.
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020 in.
Casing: Dia: 2 in. | Length: 135 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling & Testing | Method: Hollow Stem Auger
Driller: C. Stratten | Log By: B. Fritz | Date: 6/19/02 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							
5							
10							
15							
20							
25		0.0	0'-58'				
30							
35							
40							
45							
50							
55							

IT CORPORATION

Drilling Log

Monitoring Well **SCA-11D**

Project SCA Metropoliten Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55		0.0	0'-58'				
60		0.0	58'-60' 50%			SP	Light brown dry medium SAND, little fine sand.
65		0.0	63'-65' 50%			SP	Light brown dry medium SAND, some fine sand.
70		0.0	68'-70' 50%			SP	Light brown saturated medium SAND, little coarse gravel.
75		0.0	73'-75' 50%			SP	Light brown saturated medium SAND, little coarse gravel.
80		0.0	78'-80' 40%			SP	Light brown saturated medium SAND, trace fine sand.
85		0.0	83'-85' 80%			SP	Light brown saturated medium SAND, little coarse sand.
90		0.0	88'-90'				No sample collected due to flowing sands entering into augers.
95		0.0	93'-95'				No sample collected due to flowing sands entering into augers.
100		0.0	98'-100' 50%			SP	Light borwn saturated medium SAND.
105		0.0	103'-105' 80%			SP	Light borwn saturated medium SAND, little fine sand.
110		0.0	108'-110' 100%			SP	Light borwn saturated fine SAND, little medium sand.
115		0.0	113'-115' 90%			SP	Light borwn saturated fine SAND, little medium sand.
120		0.0	118'-120'				No sample collected due to flowing sands entering into augers.
125		0.0	123'-125' 100%			SP	Light borwn saturated fine SAND, little medium sand.

COMMERCIAL_NOUSCS Rev: 2/23/00 SCAMETRO.GPJ IT_CORP.GDT 9/9/02

IT CORPORATION
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Drilling Log

Monitoring Well **SCA-11D**

Project *SCA Metropoliten Avenue* Owner _____

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	128'-130' 100%			SP	Orange/brown saturated fine SAND, little medium sand.
135		0.0	133'-135' 100%			SP/GP	Orange/brown saturated medium SAND, little coarse gravel.
140		0.0	138'-140' 100%			SP/GP	Orange/brown saturated medium SAND, some coarse gravel, little fine sand.
145		0.0	143'-145' 100%			SP/GP	Orange saturated medium SAND, trace coarse gravel.
150		0.0	148'-150' 60%			SP/GP CL	Orange saturated medium SAND, some coarse gravel. Gray damp CLAY.
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

Drilling Log

Monitoring Well **MW SCA-14S**

Project: SCA Metropolitan Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 79.0 ft. | North: | East:
Top of Casing: NA | Water Level Initial: NA | Static: NA | Diameter:
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020
Casing: Dia: 2 in. | Length: 164.5 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling&Testing | Method: Hollow Stem Auger
Driller: Dennis Mayer | Log By: D. Giovanetti | Date: 1/11/03 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							Topsoil. Orange/brown coarse to fine SAND and clayey Silt (moist).
10							Brown coarse to fine SAND, little Silt, with cobbles (moist).
20							Brown coarse to fine SAND, little coarse to fine Gravel, little Silt (moist).
50							Brown coarse to fine SAND, trace Silt, trace Gravel (moist).

Continued Next Page

Shaw

Drilling Log

Monitoring Well **MW SCA-14S**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
55							*Continued*
60							Tan medium to fine SAND, trace Silt (moist).
65							
70							Tan coarse to fine SAND, trace Silt (wet).
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							
125							

Drilling Log

Monitoring Well **MW SCA-14I**

Project: SCA Metropolitan Avenue | Owner:
Location: Forest Hills, Queens, New York | Proj. No.: 837411
Surface Elev.: NA | Total Hole Depth: 110.0 ft. | North: | East:
Top of Casing: NA | Water Level Initial: NA | Static: NA | Diameter:
Screen: Dia: 2 in. | Length: 15 ft. | Type/Size: Sch 40 PVC/0.020
Casing: Dia: 2 in. | Length: 97.5 ft. | Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout | Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling&Testing | Method: Hollow Stem Auger
Driller: Dennis Mayer | Log By: D. Giovanetti | Date: 1/9/03 | Permit #: NA
Checked By: | License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							Topsoil. Orange/brown coarse to fine SAND and clayey Silt (moist).
10							Brown coarse to fine SAND, little Silt, with cobbles (moist).
20							Brown coarse to fine SAND, little coarse to fine Gravel, little Silt (moist).
50							Brown coarse to fine SAND, trace Silt, trace Gravel (moist).

Continued Next Page

Drilling Log

Monitoring Well **MW SCA-14I**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55							
60							Tan medium to fine SAND, trace Silt (moist).
65							
70							
75							
80							Brown coarse to fine SAND, trace Silt (wet).
85							
90							
95							
100							Tan medium to fine SAND, trace Silt (moist).
105							
110							
115							
120							
125							

SHAW_E&I_NOUSCS Rev: 10/28/02 SCAMETRO.AVE.GPJ IT_CORP.GDT 2/13/03

Drilling Log

Monitoring Well **MW SCA-14D**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Surface Elev. *NA* Total Hole Depth *148.0 ft.* North East

Top of Casing *NA* Water Level Initial *NA* Static *NA* Diameter

Screen: Dia *2 in.* Length *15 ft.* Type/Size *Sch 40 PVC/0.020*

Casing: Dia *2 in.* Length *137.5 ft.* Type *PVC*

Fill Material *Well Sand (#2, #00), Bentonite, Grout* Rig/Core *Drill Rig*

Drill Co. *Aquifer Drilling&Testing* Method *Hollow Stem Auger*

Driller *S. Miller, E. Moise* Log By *D. Giovanetti* Date *1/7/03* Permit # *NA*

Checked By License No.

COMMENTS
Well construction details: bentonite seal #00 Sand Filter and #2 Sand Pack.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0		0.0	0'-58'			TOPSOIL	Topsoil. Orange/brown coarse to fine SAND and clayey Silt (moist-wet).
5						SP	
10							Brown coarse to fine SAND, little Silt, cobbles (moist).
15						SP	
20						SP	Brown coarse to fine SAND, little coarse to fine Gravel, little Silt (moist).
25							Brown coarse to fine SAND, trace Silt (moist).
30						SP	
35							Brown coarse to fine SAND, trace Silt , trace Gravel (moist).
40						SP	
45							
50						SP	Light brown coarse to fine SAND, trace Silt (moist).
55							

Continued Next Page

Drilling Log

Monitoring Well **MW SCA-14D**

Project SCA Metropolitan Avenue Owner

Location Forest Hills, Queens, New York Proj. No. 837411

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55						SP	
60		0.0	58'-60' 25%			SP	Tan medium to fine SAND, trace Silt (moist).
65		0.0	63'-65' 10%			SP	Tan medium to fine SAND, trace Silt (moist).
70		0.0	68'-70' 50%			SP	Tan medium to fine SAND, trace Silt (wet).
75		0.0	73'-75' 50%			SP	Tan coarse to fine SAND, trace Silt (wet).
80		0.0	78'-80' 60%			SP	Tan coarse to fine SAND (wet).
85		0.0	83'-85' 100%			SP	Brown coarse to fine SAND, trace Silt (wet).
90		0.0	88'-90' 50%			SP	Tan coarse to fine SAND (wet).
95		0.0	93'-95' 65%			SP	Tan coarse to fine SAND, trace Silt (wet).
100		0.0	98'-100' 65%			SP	Tan medium to fine SAND, trace Silt (wet).
105		0.0	103'-105' 50%			SP	Tan coarse to fine SAND, trace Silt (wet).
110		0.0	108'-110' 65%			SP	Light brown medium to fine SAND, trace Silt (wet).
115		0.0	113'-115' 65%			SP	Light brown medium to fine SAND, trace Silt (wet).
120		0.0	118'-120' 60%			SP	Light brown medium to fine SAND, trace Silt (wet).
125		0.0	123'-125' 85%			SP	Light brown medium to fine SAND, trace Silt (wet).

Continued Next Page

Drilling Log

Monitoring Well **MW SCA-14D**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	128'-135' 100%			SP	Brown medium to fine SAND, trace Silt (wet).
135		0.0	133'-135' 60%			SP	Light brown coarse to fine SAND, little fine Gravel, trace Silt (wet).
140		0.0	138'-140' 25%			SP	Light brown coarse to fine SAND, little fine Gravel, trace Silt (wet).
145		0.0	143'-145'			SP	Light brown coarse to fine SAND, trace Gravel, trace Silt (wet).
150		0.0	148'-150' 40%			CL	Gray CLAY (wet).
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

Shaw

Shaw E&I Inc.

Drilling Log

Monitoring Well **MW SCA-15S**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Surface Elev. *NA* Total Hole Depth *82.0 ft.* North East

Top of Casing *NA* Water Level Initial *NA* Static *NA* Diameter

Screen: Dia *2 in.* Length *15 ft.* Type/Size *Sch 40 PVC/0.020*

Casing: Dia *2 in.* Length *67 ft.* Type *PVC*

Fill Material *Well Sand (#2, #00), Bentonite, Grout* Rig/Core *Drill Rig*

Drill Co. *Aquifer Drilling&Testing* Method *Hollow Stem Auger*

Driller *Dennis Mayer* Log By *D. Giovanetti* Date *1/6/03* Permit # *NA*

Checked By License No.

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							GRAVEL and Asphalt debris. Orange/brown clayey SILT, some coarse to fine Sand (moist).
5							
10							Orange/brown coarse to fine SAND, some coarse to fine Gravel, little clayey Silt (moist).
15							
20							Brown coarse to fine SAND, some coarse to fine Gravel, little Silt (moist).
25							
30							
35							
40							
45							
50							Brown coarse to fine SAND, trace coarse to fine Gravel, trace Silt (moist).
55							

Continued Next Page

Shaw

Shaw E & I Inc.

Drilling Log

Monitoring Well **MW SCA-15S**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery / Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
55						*Continued*
60						Tan coarse to fine SAND, trace Silt (wet).
65						
70						
75						
80						
85						
90						
95						
100						
105						
110						
115						
120						
125						

Drilling Log

Monitoring Well **SCA-15I**

Project: SCA Metropolitan Avenue — Owner:
Location: Forest Hills, Queens, New York — Proj. No.: 837411
Surface Elev.: NA — Total Hole Depth: 110.0 ft. — North: — East:
Top of Casing: NA — Water Level Initial: NA — Static: NA — Diameter:
Screen: Dia: 2 in. — Length: 15 ft. — Type/Size: Sch 40 PVC/0.020
Casing: Dia: 2 in. — Length: 95 ft. — Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout — Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling&Testing — Method: Hollow Stem Auger
Driller: Shawn Miller — Log By: D. Giovanetti — Date: 1/10/03 — Permit #: NA
Checked By: — License No.:

COMMENTS

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0							GRAVEL and Asphalt debris. Orange/brown coarse to fine SAND, some clayey Silt, little coarse to fine Gravel (moist).
10							Brown coarse to fine SAND, some coarse to fine Gravel, little clayey Silt, freqvent cobbles (moist).
30							Brown coarse to fine SAND, little coarse to fine Gravel, little Silt (moist).

Continued Next Page

Shaw

Shaw E & I, Inc.

Drilling Log

Monitoring Well **SCA-15I**

Project *SCA Metropolitan Avenue* Owner _____

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS
							Continued
55							
60							Tan coarse to fine SAND, trace Silt (moist).
65							
70							
75							Tan coarse to fine SAND, trace Silt (wet).
80							
85							
90							
95							
100							
105							
110							
115							
120							
125							

SHAW_E&I_NOUSCS Rev: 10/28/02 SCAMETRO.AVE.GPJ IT_CORP.GDT 2/13/03

Drilling Log

Monitoring Well **SCA-15D**

Project: SCA Metropolitan Avenue — Owner:
Location: Forest Hills, Queens, New York — Proj. No.: 837411
Surface Elev.: NA — Total Hole Depth: 145.0 ft. — North: — East:
Top of Casing: NA — Water Level Initial: NA — Static: NA — Diameter:
Screen: Dia: 2 in. — Length: 15 ft. — Type/Size: Sch 40 PVC/0.020
Casing: Dia: 2 in. — Length: 131 ft. — Type: PVC
Fill Material: Well Sand (#2, #00), Bentonite, Grout — Rig/Core: Drill Rig
Drill Co.: Aquifer Drilling&Testing — Method: Hollow Stem Auger
Driller: Dennis Mayer — Log By: D. Giovanetti — Date: 1/8/03 — Permit #: NA
Checked By: — License No.:

COMMENTS
Well construction details: bentonite seal #00 Sand Filter and #2 Sand Pack.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
0		0.0	0'-58'			FILL	GRAVEL and Asphalt debris. Orange/brown coarse to fine SAND, some clayey Silt, little coarse to fine Gravel (moist).
5						SP	
10						FILL	CONCRETE, refusal moved location 4' North. Brown coarse to fine SAND, some coarse to fine Gravel, little clayey Silt, freqvent boulders or cobbles, hard drilling (moist).
15							
20						SP	
25							
30							Brown coarse to fine SAND, little coarse to fine Gravel, trace Silt (moist).
35							
40						SP	
45							
50							Light brown coarse to fine SAND, trace Silt (moist).
55						SP	

Continued Next Page

Drilling Log

Monitoring Well **SCA-15D**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
55						SP	
60		0.0	58'-60' 60%			SP	Tan coarse to fine SAND, trace Silt (moist).
65		0.0	63'-65' 65%			SP	Tan coarse to fine SAND, trace Silt (moist).
70		0.0	68'-70' 50%			SP	Tan coarse to fine SAND, trace Silt (moist), wet in tip of spoon.
75		0.0	73'-75' 100%			SP	Tan medium to fine SAND, trace Silt (wet).
80		0.0	78'-80' 85%			SP	Tan coarse to fine SAND, little medium to fine Gravel, trace Silt (wet).
85		0.0	83'-85' 50%			SP	Tan coarse to fine SAND, little medium to fine Gravel, trace Silt (wet).
90		0.0	88'-90' 50%			SP	Tan coarse to fine SAND, trace Silt (wet).
95		0.0	93'-95' 60%			SP	Tan coarse to fine SAND, trace Silt (wet).
100		0.0	98'-100' 60%			SP	Tan medium to fine SAND, trace Silt (wet).
105		0.0	103'-105'			SP	Tan/gray coarse to fine SAND, little medium to fine Gravel, trace Silt (wet).
110		0.0	108'-110' 50%			SP	Tan/gray coarse to fine SAND, trace Silt (wet).
115		0.0	113'-115' 65%			SP	Tan/gray coarse to fine SAND, trace Silt (wet).
120		0.0	118'-120' 65%			SP	Brown medium to fine SAND, trace Silt (wet).
125		0.0	123'-125' 40%			SP	Orange/brown medium to fine SAND, little Silt (wet).

Continued Next Page

Drilling Log

Monitoring Well **SCA-15D**

Project *SCA Metropolitan Avenue* Owner

Location *Forest Hills, Queens, New York* Proj. No. *837411*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID / % Recovery	Blow Count / Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Geologic Descriptions are Based on the USCS.
							Continued
130		0.0	128'-130' 25%			SP	Orange/brown coarse to fine SAND, little coarse to fine Gravel, little Silt (wet).
135		0.0	133'-135' 25%			SP	Orange/brown coarse to fine SAND, little coarse to fine Gravel, little Silt (wet).
140		0.0	138'-140'			SP	Orange/brown coarse to fine SAND, little coarse to fine Gravel, little Silt (wet).
145		0.0	143'-145' 60%			SP	Top 2" orange/brown medium SAND, little Silt (wet).
150						CL	Gray CLAY (moist).
155							
160							
165							
170							
175							
180							
185							
190							
195							
200							

Metropolitan Avenue Site
Post-Remediation Groundwater Monitoring Network

Well construction logs are not available for the following historical groundwater monitoring wells that are proposed for the post-remediation groundwater monitoring well network:

SCA-1A
SCA-1I
SCA-5
SCA-6
SCA-7
SCA-8

APPENDIX L

GROUNDWATER MONITORING WELL SAMPLING LOG

Groundwater Monitoring Well Sampling Log

Metropolitan Avenue Site
87-01 69th Avenue and 92-34 Metropolitan Avenue, Forest Hills, New York 11375

Sampler's Name: _____ Weather Conditions: _____
Company Name: _____ Air Temperature (°F): _____
Sampler's Position: _____ Sample Location: _____
Sampling Date: _____
Sampling Time: _____

Sample Type ***(check all that apply)***

☐ Composite ☐ Grab
☐ Groundwater ☐ Surface Water ☐ Soil ☐ Sediment
☐ Leachate ☐ Industrial ☐ Storm Sewer ☐ Gas
☐ Other _____

Monitoring Well Data

Casing Diameter _____ ☐ PVC ☐ Steel ☐ Other _____
Static Water Level _____ ☐ from Well Casing ☐ from Protective Casing
Bottom Depth _____ ☐ from Well Casing ☐ from Protective Casing
Type of Water Level Indicator ☐ Steel Tape ☐ Electronic
Water Volume in Well _____
Well Condition _____

Monitoring Well Purge Data

☐ Submersible Pump ☐ PVC Bailer ☐ Suction Pump ☐ Teflon Bailer
☐ Poly Bailer ☐ Poly Cup ☐ Other _____
☐ Dedicated Purge Equipment ☐ Yes ☐ No

Pumping Rate _____ Elapsed Purge Time _____
Bail Volume _____ Number of Bails _____
Volume Purged _____ Well Volumes _____
Start and End Purge Time _____ Well Evacuated ☐ Yes ☐ No

Sampling Data

☐ Pump ☐ PVC Bailer ☐ Poly Bailer ☐ Teflon Bailer
☐ Stainless Bucket ☐ Poly Cup ☐ Tedlar Bag ☐ Direct
☐ Hand Corer ☐ Hand Auger ☐ Stainless Spoon ☐ Split Spoon
☐ Other _____

Dedicated Sampling Equipment ☐ Yes ☐ No
Metals Field Filtered ☐ Yes ☐ No
Depth of Sample _____ Sample Containers _____

Physical and Chemical Data

Odor ☐ Yes ☐ No
Sediment ☐ Yes ☐ No
Color ☐ Yes ☐ No
Appearance ☐ Clear ☐ Turbid ☐ Sheen ☐ Immiscible Product
☐ Other _____

pH (SU) _____ Temp © _____ Conductivity _____
ORP (mv) _____ Turbidity (NTUs) _____ PID (ppm) _____

Comments: _____

Groundwater Monitoring Well Sampling Log
Low Flow Rate and Sampling Data Sheet
Metropolitan Avenue Site
87-01 69th Avenue and 92-34 Metropolitan Avenue, Forest Hills, New York 11375

Site: Metropolitan Avenue Site

Sheet _____ of _____

Date:

Environmental Consulting Firm:

Weather:

Field Personnel:

Monitoring Well No.: **Well Permit No.:**

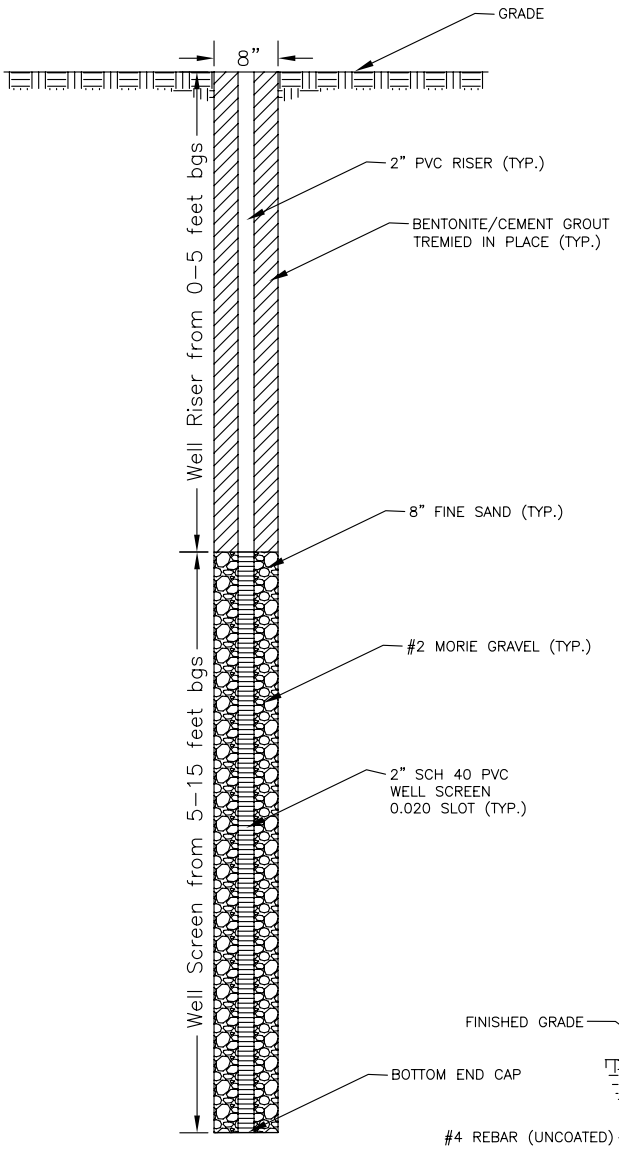
Time	Purging	Sampling	pH (pH units)		Temperature (degrees C)		Specific Conductivity (mS/cm)		Redox Potential (mv)		Dissolved Oxygen (mg/L)		Turbidity (NTU)	Volume Water Removed	Pumping Rate	Depth to Water
			Reading	+/- 0.1	Reading	± 3%	Reading	± 3%	Reading	± 10mv	Reading	± 10%	Reading	(ml)	(ml/min)	(ft-TOIC)

Notes:

APPENDIX M

TYPICAL CONSTRUCTION DETAILS FOR SOIL VAPOR POINT

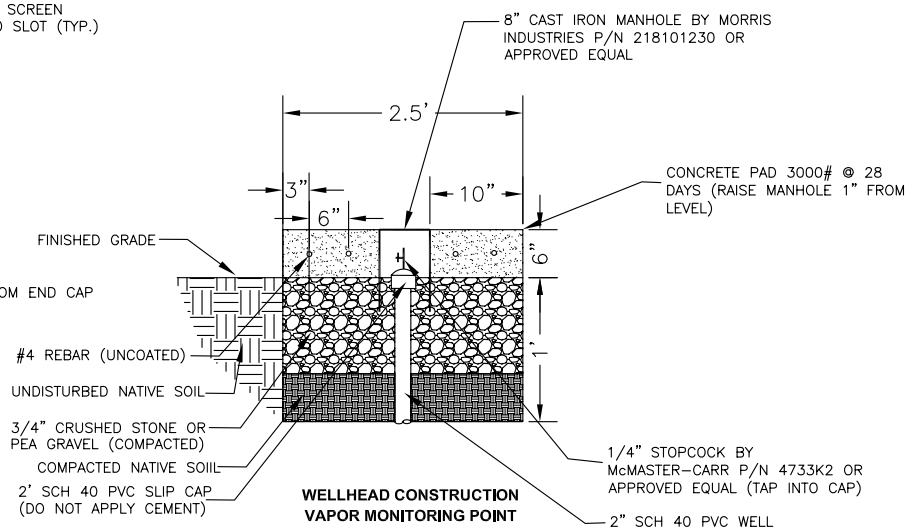
OFFICE	DRAWING NUMBER
Harriman, NY	



VAPOR MONITORING POINT

DETAIL 1

SCALE: N.T.S.



WELLHEAD CONSTRUCTION VAPOR MONITORING POINT

DETAIL 2

SCALE: N.T.S.

Shaw Environmental & Infrastructure
Engineering of New York, P.C.

TYPICAL CONSTRUCTION DETAILS FOR
SOIL VAPOR MONITORING POINT
METROPOLITAN AVENUE SCHOOL SITE
87-01 69TH AVENUE
92-34 METROPOLITAN AVENUE
FOREST HILLS, NY 11375

DESIGNED BY		9/10/07	CHECKED BY		9/10/07
DRAWN BY		9/10/07	APPROVED BY		9/10/07

SCALE:	DRAWING NO.	PROJECT NO.	SHEET NO.	REVISION NO.
		111256		--

File: N:\Cad\Projects\NYCSCA - Metro Ave\SMP 2007\Typical Construction Details for Soil Vapor Monitoring Point.dwg
Plot Date/Time: Sep 11, 2007 - 10:36am
Plotted By: amy.fontana

APPENDIX N

ANNUAL INSPECTION FORM/CHECK LIST

Annual Inspection Form/Checklist

Metropolitan Avenue Site
87-01 69th Avenue and 92-34 Metropolitan Avenue, Forest Hills, New York 11375

Inspector's Name: _____ Weather Conditions: _____
Company Name: _____ Air Temperature (°F): _____
Inspector's Position: _____
Inspection Date: _____
Inspection Time: _____

A. **SSDS SYSTEM INSPECTION**

1. Walk the entire roof surface of system enclosure shed and inspect interior of shed.

1.1 Any rust or other debris in the vicinity of the post, sleeve and discharge cap at the SSDS stack vent?
_____**Yes** (Explain below in Comments Section) _____No
1.2 Any rust or other debris in the vicinity of the inline filter/bird screen?
_____**Yes** (Explain below in Comments Section) _____No
1.3 Are the SSDS blower unit functioning properly and spare blower unit available?
_____**Yes** (Explain below in Comments Section) _____No
1.4 Is the inline filter differential pressure gauge functioning properly?
_____Yes _____**No** (Explain below in Comments Section)
1.5 Is the blower inlet vacuum indicator functioning properly?
_____Yes _____**No** (Explain below in Comments Section)
1.6 Are the blower outlet pressure gauge and temperature gauge functioning properly?
_____Yes _____**No** (Explain below in Comments Section)
1.7 Is the discharge flow element functioning properly?
_____Yes _____**No** (Explain below in Comments Section)
1.8 Is the dilution air intake functioning properly?
_____Yes _____**No** (Explain below in Comments Section)
1.9 Are the indicator lights on the BMS panel functioning properly?
_____Yes _____**No** (Explain below in Comments Section)
* Comments:

B. **BASEMENT INSPECTION**

2. Walk the entire basement floor

2.1 Any visible cracks in the basement floor?_____**Yes** (See 2.4, 2.5, 2.6) _____No
2.2 Any visible cracks in the basement wall?_____**Yes** (See 2.4, 2.5, 2.6) _____No
2.3 Any other visible openings (unintended) in either the floor or walls?_____Yes (See 2.4, 2.5, 2.6) _____No
2.4 Draw approximate location of floor and/or wall cracks/openings on site map.
2.5 Note the length of the crack/opening.
2.6 Note the width of the crack/opening.
* Comments:

C. **EXTERIOR INSPECTION**

3. Walk and inspect the entire perimeter of the property. _____Yes _____**No** (Explain below in Comment Section)

4. Walk and inspect all of the paved areas of the property.
4.1 Are there significant cracks or deterioration of the paved areas? _____**Yes** (Explain in Comment Section) _____No
4.2 Removal of any pavement?_____**Yes** (Explain in Comment Section) _____No
4.3 Soil washing or erosion (gullies, soil washed out onto the pavement)_____**Yes** (Explain in Comment Section) _____No
5. Walk and inspect all of the unpaved areas of the property.
5.1 Vehicular use on the unpaved areas (tire tracks, rutting, etc.)?_____**Yes** (Explain in Comment Section) _____No
5.2 Any structures been constructed on the unpaved areas?_____**Yes** (Explain in Comment Section _____No
5.3 Are signs of intrusive activities ?_____**Yes** (Explain in Comment Section) _____No
* Comments:

D. **SEVERE CONDITION INSPECTION**

6. Walk and inspect the entire perimeter of the property.

7. Walk and inspect all of the paved areas of the property.

8. Walk and inspect all of the unpaved areas of the property.

8.1 Note type of severe condition (i.e., severe erosion or flooding)._____**Yes** (Explain in Comment Section)_____No
8.2 Note impacts from severe condition._____**Yes** (Explain in Comment Section) _____No
* Comments:

Inspector's Signature: _____

APPENDIX O

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

FOR THE

METROPOLITAN AVENUE SITE
87-01 69TH AVENUE
92-34 METROPOLITAN AVENUE
FOREST HILLS, NEW YORK
BOROUGH OF QUEENS
(VCP AGREEMENT # V-00500-2)
SCA Job No.: 16032
SCA LLW No.: 12545

SEPTEMBER 2007

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
30-30 THOMSON AVENUE
LONG ISLAND CITY, NEW YORK 11101-3045

TABLE OF CONTENTS

Section **Page**

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared on behalf of the New York City School Construction Authority (NYCSCA) to support the implementation of the Monitored Natural Attenuation (MNA) program to verify natural attenuation of residual contamination in groundwater beneath the Metropolitan Avenue Site (hereafter referred to as the "Site") and to monitor soil vapor conditions along the perimeter of the Site. The Site is located in Forest Hills, Queens, New York. The Site is the location of two (2) New York City public schools.

This QAPP presents the sampling and analysis method to be utilized and outlines the responsibilities and procedures for data quality assurance, specific to MNA program. The QAPP is organized into sections that detail project management responsibilities, objectives for measurement, field sampling protocols, recordkeeping, and chain-of-custody requirements, sample preparation and laboratory analysis, data reduction and validation, and the overall laboratory and field quality assurance program components.

2.0 PROJECT RESPONSIBILITY

NYCSCA is responsible for the remediation and associated sampling at the Site. NYCSCA has retained Shaw Environmental & Infrastructure, Inc. (Shaw) for the implementation and reporting. Shaw will perform the field monitoring and sampling, review the data generated, and prepare the associated reports for submittal to the New York State Department of Environmental Conservation (NYSDEC).

2.1 Project Management Responsibility

As directed by NYCSCA, Shaw will provide all project management and staffing for this project. The Shaw Program Manager will be responsible for overall project implementation and coordination with NYCSCA. The Project Manager has overall responsibility for ensuring that the project objectives and schedule are met. In addition, he/she is responsible for technical quality control and project oversight and will provide qualified site personnel and laboratory services for this Monitoring Program. The Project Manager has the authority to commit the resources necessary to meet project objectives and requirements, and to ensure that technical and scheduling objectives are achieved successfully.

The project staff are responsible for implementing the field investigation in accordance with this QAPP in order to meet the project objectives and requirements. The project staff will report directly to the Shaw Project Manager.

2.2 Quality Assurance Responsibility

QA responsibilities for the project are summarized below.

2.2.1 QAPP Review/Approval

The Project Quality Assurance/Quality Control (QA/QC) Officer is responsible for review and approval of the QAPP and the Field Sampling and Analysis Plans, and will provide QA technical assistance to the project personnel. The QA/QC Officer will not be directly involved in the day-to-day operations of the project but will be available to resolve any QA/QC discrepancies.

2.2.2 Data Assessment

It will be the responsibility of the Project QA/QC Officer, the Project Manager, and their staff to evaluate the analytical data to determine if the data generated have met the project data quality objectives and are sufficient to meet the projects monitoring objectives.

2.3 Field Operation Responsibility

2.3.1 Field Sampling

Each sampling event will be headed by a designated Field Operations Leader (FOL) who will be responsible for leading and coordinating all field activities. The FOL, who will report directly to the Shaw Project Manager, will be responsible for the implementation of the field program in accordance with all of the conditions of the QAPP, keeping field activities on schedule. The FOL will also be responsible for identifying any problems in the field and/or any changes to the monitoring program and initiating the appropriate corrective action with the Project Manager to resolve them.

2.3.2 Field Measurements

The FOL is responsible for ensuring all field instruments are in working order, and are calibrated and operated by the field team, and that all field measurements are recorded in the field log book.

2.4 Laboratory Responsibilities

A NYSDEC approved analytical laboratory will perform the groundwater analysis and the soil vapor analysis. A copy of the laboratories Quality Assurance (QA) Manual program will be provided upon laboratory selection.

3.0 QA OBJECTIVES FOR DATA MEASUREMENT

The overall Quality Assurance (QA) objective of the groundwater and soil vapor monitoring program is to develop and implement procedures for field sampling, chain of custody, laboratory analysis and reporting, and to provide reliable analytical results. Specific procedures to be used for sampling, chain of custody, laboratory analysis, reporting, internal quality control, audits, preventative maintenance, and corrective actions are described in other sections of this QAPP. The purpose of this section is to address the Data Quality Objectives with respect to accuracy, precision, completeness, representativeness, and comparability.

3.1 Data Quality Objectives

Data quality objectives (DQO) are based on the concept that different data uses require different levels of data quality. Data quality can be defined as the degree of uncertainty in the data with respect to precision, accuracy and completeness. The 5 general levels of data quality are:

Level 1 – field screening or analysis using portable instruments. Results are often not compound-specific and not quantitative, but results are available in real-time. It is often used for health and safety monitoring and initial site characterization.

Level II – field analyses using more sophisticated portable analytical instruments; in some cases, the instruments may be set up in a mobile laboratory. There is a wide range in the quality of data that can be generated, depending on the use of suitable calibration standards, reference materials, and sample preparation equipment, and the training of the operator. Results are available in real-time or several hours.

Level III – USEPA routine analytical services. All analyses are performed in an off-site NYSDOH ELAP-certified analytical laboratory following standard USEPA protocols. Level III is characterized by rigorous QA/QC protocols and documentation.

Level IV – analytical analysis by pre-approved, non-standard methods. All analyses are performed in an off-site approved analytical laboratory. Method development or method modification may be required for specific constituents or detection limits. Level IV will be characterized by rigorous QA/QC protocols and documentation.

Level V – physical property and engineering material analysis by approved standard or non-standard methods. All analyses are performed in an off-site laboratory. QA/QC protocols and documentation may be required for some analyses.

Data generated as part of the remedial program at the Metropolitan Avenue Site will include both Level I and Level III.

Field blank, trip blank and duplicate samples will be analyzed to assess the quality of the data resulting from the field sampling program. QA samples are described in Section 8.1.

The level of Quality Control (QC) provided by the laboratory will be as required by the applicable USEPA methods. Deliverables for groundwater sampling results will conform to NYSDEC Analytical Services Protocol (ASP) Category B.

Completeness is defined as the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Completeness is expressed as the percentage of valid data obtained from a measurement system. For data to be considered valid, it must meet all the acceptance criteria including accuracy and precision, as well as any other criteria specified by the analytical method used. Samples for which the critical data points fail accuracy or precision data quality objectives, and therefore completeness objectives, will require reanalysis of samples until the quality objectives are met. Sufficient sample volume will be collected to ensure that reanalysis can occur as needed.

Representativeness is the extent to which the database reflects the conditions in the study area. Representativeness is a function of the analytes evaluated and sampling locations. The sampling program is designed to maximize the collection of representative data. The historical database that has been compiled through site investigation, implementation of the remedial program, and the ongoing monitoring program has demonstrated that the contaminant plume is delineated and that the sampling program is adequate in monitoring concentration changes over time. Representativeness will be satisfied by ensuring that the sampling plan is followed, proper sampling techniques are used, proper analytical procedures are followed, and holding times of the samples are not exceeded.

Comparability expresses the degree of confidence with which one data set can be compared to another. Key factors promoting comparability are use of standard field and laboratory techniques, consistency in reporting (e.g., units) and collection of representative data. Because of the use of standard methods and the development of a formal QAPP, data generated as part of this monitoring program are anticipated to have high comparability with other data collected under this program.

4.0 FIELD SAMPLING AND ANALYSIS PLAN

The Field Sampling Plan (FSP) presents detailed methods and procedures for the collection groundwater samples for laboratory chemical analysis. The procedures described in the FSP are referenced from standardized procedures included in the appendices.

4.1 Sampling Approach and Analytical Program

The field sampling, analytical and monitoring activities to be completed include groundwater sampling and soil vapor sampling. A groundwater monitoring network consisting of the following sixteen (16) existing monitoring wells will be sampled upon approval of the Final Engineering Report by the NYSDEC: SCA-1A, SCA-1I, SCA-5, SCA-6, SCA-7, SCA-8, SCA-10S, SCA-11S, SCA-11I, SCA-11D, SCA-14S, SCA-14I, SCA-14D, SCA-15S, SCA-15I, and SCA-15D. These groundwater monitoring wells will be sampled on a quarterly basis for 2 years after which time, the NYSDEC and the NYSDOH will evaluate the data for determination if monitoring can be terminated.

A soil vapor monitoring network consisting of the following nine (9) newly constructed vapor monitoring points will be sampled upon approval of the Final Engineering Report by the NYSDEC: VP-15, VP-16, VP-17, VP-18, VP-19, VP-20, VP-21, VP-22, and VP-23. These vapor monitoring points will be sampled concurrent with the groundwater monitoring wells on a quarterly basis for 2 years, after which time, this data will also be evaluated for determination if monitoring can be terminated.

4.2 Decontamination Procedures

4.2.1 Groundwater Sampling Pump Cleaning

Decontamination of pump should be performed at monitoring well location away from well prior to use. The following procedure will be followed when decontaminating the bladder pump:

1. Place plastic sheet/bag on ground adjacent to pump.
2. Disassemble bladder pump.
3. Potable water rinse.
4. Alconox detergent and potable water scrub.
5. Potable water rinse.
6. Ten percent nitric acid rinse (when sampling for metals).
7. Deionized water rinse.
8. Methanol rinse.
9. Deionized water rinse.
10. Air dry when possible.
11. Reassemble bladder pump.

4.2.2 Groundwater Sampling Equipment

All reusable sampling equipment will be pre-cleaned prior to field entry. The following cleaning procedures will be used:

1. Alconox detergent and potable water scrub.
2. Potable water rinse.
3. Deionized water rinse or potable water rinse.
4. Methanol rinse.
5. Deionized water rinse.
6. Air dry on plastic sheeting.

Following this decontamination procedure, equipment will be wrapped in aluminum foil or stored in sealed polyethylene bags for on-site use. Whenever possible, pre-cleaned equipment will be used; however, if the need arises, equipment will be cleaned in the field according to the general procedures described above.

4.3 Groundwater Sample Collection

The groundwater sampling program includes monitoring wells at locations upgradient and at the downgradient property boundary, and off site, in the downgradient direction of groundwater flow.

After noting any conditions that may affect the quality of the groundwater sample, an accurate water level measurement must be obtained. Measurement will be obtained utilizing a portable electronic water level indicator that has been decontaminated prior to use at each monitoring location. The initial water level measurement will be recorded in bound field log books. After recording the water level, wells will be purged of 3 well volumes and sampled using the Low Stress (or Low-Flow) Purging and Sampling Procedure. This procedure is a preferred method of sampling. Low Stress Purging and Sampling results in the collection of groundwater samples from monitoring wells that are representative of groundwater conditions in the geological formation. This is accomplished by minimizing stress on the geological formation and minimizing disturbance of sediment that has collected in the well.

Contaminated purge waters will be containerized for subsequent treatment or disposal in accordance with applicable laws and regulations. Non-contaminated purge water will be discharged to the ground surface.

In no case will purge water be directed to surface waters or stormwater systems that discharge to off-site surface waters.

All field measurements obtained during purging and sampling will be compared to previous sampling events (if available) to ensure that measurements are within their normal range (as defined by previous sampling events). Measurements found to be outside their normal range will be re-measured and noted in the field logbook.

Detailed procedures outlining the protocol for groundwater sample collection are provided below. All sampling equipment utilized will be constructed of inert materials designed to obtain samples with the minimum agitation possible. All non-dedicated sampling equipment will be decontaminated in accordance with the procedures outlined below.

4.3.1 Low-Flow Sampling

The purpose of the low-flow (stress) purging and sampling procedure is to collect groundwater samples from monitoring wells that are representative of groundwater conditions in a particular geological formation. This is accomplished by setting the intake velocity of the sampling pump to a flow rate that limits drawdown inside the well casing.

4.3.2 Pre-Sampling Activities

1. Start at the well known or believed to have the least contaminated groundwater and proceed systematically to the well with the most contaminated groundwater. If contaminant levels are not known, upgradient wells should be sampled first. Check the well, the lock, and the locking cap for damage or evidence of tampering. Record observations.

2. Lay out sheet of polyethylene for placement of monitoring and sampling equipment.

3. Measure and record the depth to water (to 0.01 feet) in all wells to be sampled prior to purging. Care should be taken to minimize disturbance in the water column and dislodging of any particulate matter attached to the sides or settled at the bottom of the well. If the well casing does not have a reference point (usually a V-cut or indelible mark in the well casing), make one.

4.3.3 Sampling Procedures

1. Install Pump: Slowly lower the pump, safety cable and disposable or dedicated Teflon tubing into the well to the depth specified for that well. The pump intake must be kept at least 2 feet above the bottom of the well to prevent disturbance and resuspension of any sediment present in the bottom of the well. Record the depth to which the pump is lowered.

2. Measure Water Level: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.

3. Purge Well: Start pumping the well at 200 to 500 milliliters per minute (ml/min). The water level should be monitored approximately every 5 minutes. Ideally, a steady flow rate should be maintained which result in a stabilized water level (drawdown of 0.3 feet or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to

ensure stabilization of the water level. Care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.

4. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters (temperature, specific conductance, pH, redox potential, and DO) approximately every 5 minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows:

   - ±0.1 for pH
   - ±3% for specific conductance (conductivity)
   - ±10 mv for redox potential
   - ±10% for DO

   Dissolved oxygen usually requires the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

5. Collect sample directly from the dedicated or disposable tubing, not from the flow-through monitoring cup discharge hose. Maintain a constant pumping rate during sampling.

6. Remove Pump and Tubing: After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the well.

7. Measure and record well depth.

8. Close and lock the well.

4.3.4 Field Measurements

Field measurements of pH, specific conductance, temperature, dissolved oxygen, and oxidation-reduction potential will be obtained using the YSI 6820 Multi-Parameter Water Quality Monitor or equivalent device. The YSI 6820 will be calibrated and operated in accordance with the procedures specified in the manual to be provided by the manufacturer.

4.4 Soil Vapor Monitoring Point Construction

The new soil vapor monitoring points in the monitoring network will be installed utilizing a hollow stem auger drill rig. The vapor monitoring points will be constructed of flush-mounted, 2-inch diameter PVC with 10 feet of 0.020 slot PVC well screen. The vapor points will be installed to a depth of approximately 15 feet bgs. A # 2 size gravel pack will be installed around the perimeter of the well screen and the remainder of the 6-inch well bore will be filled with bentonite/cement grout tremied into place. The wellhead will be fitted with a ¼-inch sampling valve (for soil gas samples) and a 2-inch PVC slip cap (for water level and water quality measurements).

4.5 Soil Vapor Sample Collection

The following soil vapor sampling protocol is provided:

- The cast iron manhole will be removed and each vapor monitoring point will be purged of 1 well volume through the stopcock using a vacuum pump. The stopcock will then be closed and the well will be allowed to equilibrate for 24 hours;
- A PID meter will be attached to the stopcock with a length of ¼-inch polyethylene tubing. A field reading for total VOCs will be measured and recorded;
- A 6-liter stainless steel Summa canister will be attached to the polyethylene tubing. (The Summa canister must be fully documented by the laboratory for Quality Assurance, which includes properly functioning valves and fully cleaned);
- The valve on the Summa canister will be opened for collection of the sample;
- Following sample acquisition, the valve will be shut off and the canister will be removed from the polyethylene tubing. The canister's steel cap will be replaced over the inlet point and tightened with a wrench or pliers. The stopcock will be closed and the well lid replaced.
- A tag will be attached to the Summa canister identifying the sampling point, the date and time of the sampling event, the analytical method (TO-15), and the sampler's initials;
- The sample will be recorded on a Chain of Custody that will include the sample identification, the date and time of the sampling event, the analytical method, and the laboratory identification number of the Summa canister, to ensure proper analysis in the event that the canister's tag is lost or destroyed. Sample analysis will be for volatile

organic compounds including chlorinated hydrocarbons. Samples will be shipped to a certified laboratory via overnight delivery for next day arrival, and;

- All sampling data will be recorded in a field logbook.

4.6 Analysis Plan

Groundwater samples will be analyzed for VOCs per EPA Method 8260, including chlorinated hydrocarbons.

QA/QC samples to be collected and analyzed include:

- Trip Blanks: One per matrix analyzed for VOCs (water) per shipment
- Field Blanks: One per event
- Field Duplicates: One per event
- MS/MSDs: One per event

Soil vapor samples will be analyzed for VOCs per EPA Method TO-15, including chlorinated hydrocarbons.

QA/QC samples to be collected and analyzed include:

- Trip Blank: One per event
- Field Duplicate: One per event

5.0 RECORDKEEPING AND CHAIN-OF-CUSTODY

5.1 Field Logs

Field records must be documented in the field logbook and must contain sufficient information such that someone else can reconstruct the sampling event without reliance on the sample collector's memory. The logbook is a controlled document which records all major on-site activities. The logbook is a bound notebook with pages that cannot be removed without cutting or tearing pages. Daily entries into the logbook may contain a variety of information. At the beginning of each day the following information must be recorded:

- Date
- Start time (arrival)
- Weather
- All field personnel present
- Any visitors present
- End time (departure)

Entries in the field logbook will include, as applicable:

- Start and completion time of activities at each sample location.
- Sampling point name and description.
- Monitoring well or vapor point purging procedure and equipment.
- Monitoring well-specific information such as static water level, depth, and volume purged.
- Vapor point-specific information such as volume purged and photoionization detector (PID) readings.
- Sample depth interval for each well.
- Sample collection procedure and equipment.
- Sample flow rate for low-flow groundwater sampling or vapor sampling.

- Type and number of sample containers used.
- Preservatives used.
- Collector's sample identification numbers.
- Laboratory's sample identification numbers and sample shipment information.
- Modifications to health and safety protocols, (e.g., level of protection).
- Work performed.
- Field observations.
- Pertinent weather factors such as temperature, wind direction, and precipitation.
- Deviations from established protocols, if any.

Upon return to the office, individual field data sheets will be completed and signed, and placed in the project file. Photocopies will be made of all field logbook pages and placed in the project file. This ensures a record exists in the office of all field and sampling activities, and limits the potential loss of field notes due to the loss or destruction of the log book in the field.

5.2 Chain-of-Custody

Chain-of-custody records for all samples will be maintained. A sample will be considered to be "in custody" of an individual if said sample is either in direct view of or otherwise directly controlled by that individual. Storage of samples during custody will be accomplished according to established preservation techniques, in appropriately sealed storage containers. Chain-of-custody will be accomplished when the samples or sealed sample coolers are directly transferred from one individual to the next, with the first individual witnessing the signature of the recipient upon the chain-of-custody record.

If samples are to be sent via a courier (e.g., Federal Express), signed Chain-of-Custody Forms will be included in each cooler or sample shipment container documenting sample content. Chain-of-Custody Forms will be placed in a zip-lock bag or equivalent sealable pouch and attached to the inside lid of the sample cooler or sample shipment container. A copy will be kept by the sampling personnel.

The chain-of-custody records will contain the following information:

- Respective sample numbers of the laboratory and Shaw, if available.
- Signature of collector.

- Date and of time of collection.
- Sample type (i.e., groundwater or soil vapor).
- Identification of well point or soil vapor point.
- Number of containers.
- Parameters requested for analysis, if appropriate.
- Signature of person(s) involved in the chain of possession.
- Description of sample bottles and their condition.
- Problems associated with sample collection (i.e., breakage, no preservatives), if any.

5.3 Laboratory Chain-of-Custody Procedures

The purpose of the chain-of-custody procedure is to document in a legally defensible manner, the transfer of custody for each sample from collection through analysis to analytical data reports. The sample custody procedures to be used by the laboratory will conform to the guidelines of the NYSDEC Analytical Services Protocol (ASP) for groundwater, and are performed under the supervision of the Sample Coordinator. The Sample Coordinator will have primary responsibility for ensuring that chain-of-custody procedures are followed and all documentation is properly executed.

5.3.1 Sample Receiving and Log-In

When samples arrive at the laboratory, the sample coordinator from the laboratory documents the condition of the locked or sealed shipping box on the custody form. He/she then checks the sample label information against the custody record, notes the conditions of the samples and verifies proper container and preservative procedures, where applicable. Samples are then logged in by assigning laboratory identification numbers in serialized ascending sequence. The sample log-in record will include the cooler temperature (for groundwater samples), sample number, date of receipt, condition of sample when received, the assigned laboratory number, sample preparation, sample distribution and other pertinent information. A sample distribution sheet will be generated.

5.3.2 Sample Storage

Prior to preparation and analysis, all groundwater samples will be secured in a refrigerator maintained at approximately 4°C. Specific temperature storage is not required for the soil vapor samples.

5.3.3 Tracking During Sample Preparation and Analysis

Analysts will sign for the receipt of all samples to be processed and maintain the samples in their possession or in view at all times when the samples are outside of the storage area. At all times when custody is transferred, both the issuing and receiving parties will verify that information in the sample label is properly recorded.

6.0 CALIBRATION PROCEDURES

This section describes procedures for maintaining the accuracy of all instruments and measuring equipment to be used for field measurements and laboratory analysis.

6.1 Field Instruments

All instruments used in the field to gather, generate, or measure environmental data will be calibrated in accordance with procedures consistent with those recommended by the manufacturer to provide Level I field screening quality data. All equipment to be used during the field work will be examined to verify that it is in proper operating condition. Field notes from previous sampling work will also be reviewed to ensure any previous equipment problems are not overlooked and that all necessary repairs have been carried out.

Calibration of field instruments will be performed at intervals specified by the manufacturer or more frequently as conditions warrant.

6.2 Laboratory Instruments

All materials used for instrument calibration, internal standards and surrogate standards will be of the highest purity available and will be obtained through the USEPA Pesticide and Industrial Chemicals Repository, or a suitable commercial source. The procedures used and frequency of calibration for all analytical instruments will satisfy the NYSDEC ASP requirements.

7.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

All samples collected for chemical analysis during the groundwater monitoring program and the soil vapor monitoring program will be analyzed by a laboratory certified by the New York State Department of Health's Environmental Laboratory Approval Program (ELAP) to perform laboratory services in the State of New York. A copy of the laboratory certification will be provided upon selection of the laboratory.

7.1 Field Measurement Procedures

7.1.1 Groundwater Sample Measurements

Measurements to be made in the field for all groundwater samples include:

Total VOCs (vapors)

pH

Temperature

Specific conductance

Turbidity

Dissolved oxygen

Water level

All measurements made using field instruments will provide Level 1 data. Instruments include a photoionization detector (PID) with a 11.2 eV lamp, a multi-parameter water quality monitor, and a water level indicator.

7.1.2 Soil Vapor Sample Measurements

Measurements to be made in the field for soil vapor samples include PID readings prior to collection of each sample.

7.2 Laboratory Procedures

The samples will be managed in the laboratory in accordance with the procedures specified in the laboratory QA Manual.

7.3 Laboratory Data Reporting

Laboratory reports will be Category B deliverables format for groundwater, and Tier II (standard report plus QC) for soil vapor.

8.0 INTERNAL QUALITY CONTROL CHECKS

Quality control methods used in field activities and in the laboratory ensure that the data generated meet all the precision and accuracy objectives discussed in Section 3. In addition, these procedures provide a check of the integrity of sampling equipment and decontamination procedures, as well as possible sources of sample contamination in the laboratory.

8.1 Field Sample Collection

8.1.1 Groundwater and Soil Vapor Samples

Quality control procedures for the groundwater and soil vapor field sampling activities will include the following measures:

- Field blanks (groundwater only)
- Trip blanks
- Field duplicates
- Matrix spike/matrix spike duplicates (groundwater only)

Field and trip blanks are used as control or external QA/QC samples to detect contamination that may be introduced in the field (either atmospheric or from sampling equipment), in transit to or from the sampling site, or in the bottle preparation, sample log-in, or sample storage stages within the laboratory.

Field blank samples, prepared in the field, are analyzed to check for procedural contamination at the site that may cause sample contamination. Field blanks are collected water samples by pouring laboratory-supplied water through the sampling equipment. Trip blanks, prepared in the laboratory, are unopened VOC jars filled with laboratory-supplied water or summa canisters under vacuum. Trip blanks are used to assess the potential for contamination of water samples or vapor samples due to volatile contaminant migration during sample shipment and storage. Duplicates are pairs of identical samples collected in the field to check variability in sampling and analysis.

Field blanks will be analyzed at a rate of one per sampling event. One trip blank will accompany each shipment. Duplicates will be collected at a rate of one per sampling event. Method-related QC samples (spikes, duplicates, method blanks, etc.) will be performed by the laboratory as required by the analytical method.

MS/MSDs are used to determine the effects of matrix interference on analytical results. Spikes of analytes are added to aliquots of sample matrix. Samples are spiked to determine accuracy as a percentage recovery of the analyte from the sample matrix. A matrix duplicate is prepared in the same manner as the matrix spike sample. One MS/MSD will be performed for each groundwater sampling event.

8.2 Field Measurements

Quality control procedures for measurements made in the field will include following the proper calibration specified by the manufacturer to ensure proper working order and performing all field measurements in duplicate.

All duplicate field measurements must be within 10 percent of each other. Field measurements outside of this limit will require a third measurement. The deviating measurement will then be crossed out and initialed in the field log. If measurements within this limit cannot be obtained, the instrument will be recalibrated or replaced.

8.3 Laboratory Analysis

Laboratory quality control procedures will follow the applicable USEPA method requirements. These procedures will include at a minimum, the following where applicable:

- Method blanks
- Surrogate spikes/recovery
- Matrix spikes/Matrix spike duplicates (MS/MSD)
- Internal standards
- Instrument calibration

Method blanks provide a check for residual contamination in the analytical instrument and are performed for each sample delivery group. Surrogates are non-target analytes that are added to samples and QA/QC samples to evaluate the effectiveness of the analyses. MS/MSD analysis may be on a sample aliquot associated with the monitoring program, or it may be performed on another sample run in the same batch.

9.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The Project Manager will be kept apprised of the QA/QC aspects related to the ongoing monitoring program to ensure the established objectives may be met. Reports to management will include:

- An assessment of measurement data accuracy, precision, and completeness.
- Significant QA/QC problems and recommended solutions.
- Resolutions of previously stated problems.

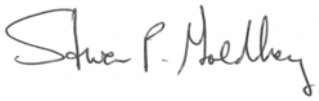
The Laboratory Director will provide QA update as part of the laboratory data package for each sampling episode to describe any QA/QC problems and corrective actions.

10.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

Shaw has developed a Quality Assurance Project Plan for the Metropolitan Avenue Site located at 87-01 69th Avenue and 92-34 Metropolitan Avenue in Forest Hills, Queens, New York.

Shaw Environmental & Infrastructure, Inc.

Amy E. Fontana
Senior Environmental Scientist



Steven Goldberg, Ph.D., CPG
Senior Project Manager

APPENDIX P

MAINTENANCE INSPECTION FORM/CHECK LIST

Maintenance Inspection Form/Checklist

Metropolitan Avenue Site
87-01 69th Avenue and 92-34 Metropolitan Avenue, Forest Hills, New York 11375

Inspector's Name:	Weather Conditions:
Company Name:	Air Temperature (°F):
Inspector's Position:	
Date of Maintenance Activities:	
Time of Maintenance Activities:	

A. 1.0 DESCRIPTION OF ROUTINE MAINTENANCE ACTIVITIES PERFORMED

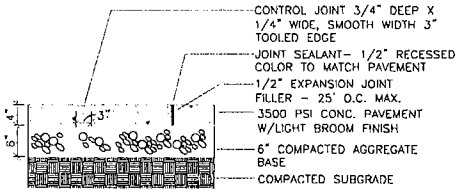
1.1 What activities were performed?
1.2 Where were the activities performed?
1.3 What equipment or accessory was repaired or replaced?
1.4 Are photographs of the maintenance area attached to this form? _____Yes _____**No** (Explain in Comments)
1.5 Is a sketch of the maintenance area attached to this form?_____Yes _____**No** (Explain in Comments)
1.6 Are copies of invoices for maintenance performed and receipts for replacement items attached to this form?_____Yes _____**No** (Explain in Comments)
* Other comments:

B. 2.0 DESCRIPTION OF NON-ROUTINE MAINTENANCE ACTIVITIES PERFORMED

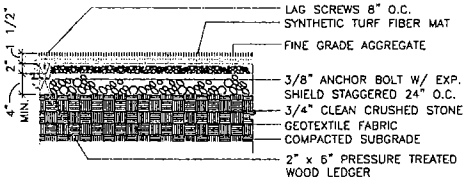
2.1 What activities were performed?
2.2 Where were the activities performed?
2.3 What equipment or accessory was repaired or replaced?
2.4 Are photographs of the maintenance area attached to this form?_____Yes _____**No** (Explain in Comments)
2.5 Is a sketch of the maintenance area attached to this form?_____Yes _____**No** (Explain in Comments)
2.6 Are copies of invoices for maintenance performed and receipts for replacement items attached to this form?_____Yes _____**No** (Explain in Comments)
* Other comments:

Inspector's Signature: _____

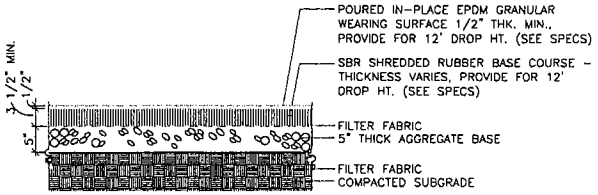
OFFICE Pittsburgh, PA | DRAWING NUMBER 111256-FIG2



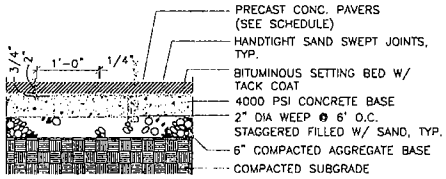
1 Concrete Pavement
1" = 1'-0"



4 Synthetic Turf - Infill Type
1" = 1'-0"

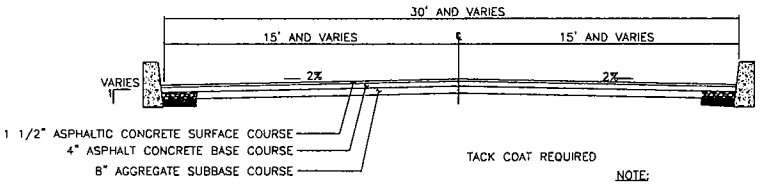


7 Resilient Rubber Surface - Poured in Place
1" = 1'-0"



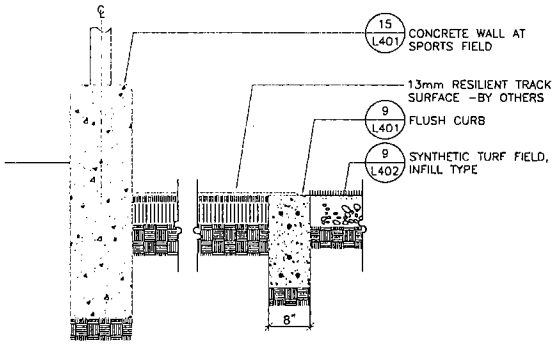
SECTION

2 Concrete Block Pavement
1" = 1'-0"

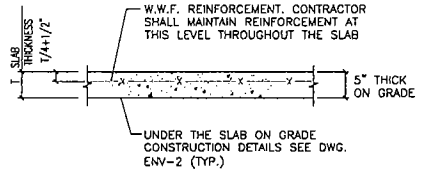


NOTE:
SEE PLANS FOR ACTUAL ROAD GRADES.

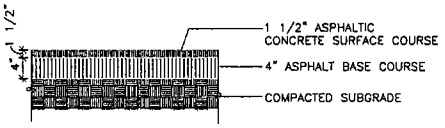
5 Typical Interior Road Section
N.T.S.



3 Resilient Surface Running Path
1" = 1'-0"



6 Slab Construction
N.T.S



8 Asphalt Pavement
1" = 1'-0"

Shaw

DESIGNED BY: --	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
DRAWN BY: B. Snyder	FIGURE 2 DESIGN DETAILS OF PRINCIPAL SITE COVERS
CHECKED BY: --	METROPOLITAN AVENUE SCHOOL SITE 87-01 88th STREET 92-34 METROPOLITAN AVENUE FOREST HILLS, NY 11375

APPROVED BY:	DATE:	SCALE:	DRAWING NO.	SHEET NO.
--	7/25/07	AS SHOWN	111256-FIG2	--