TRANSMITTAL LETTER

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TO: Mr. Jonathan Greco
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remediation Bureau B, 12th Floor
625 Broadway
Albany, NY 12233-7016
Via e-mail only

DATE: March 7, 2014

RE: Waste Characterization/Beneficial Re-Use Sampling Plan
333 Schermerhorn Street)
Brooklyn, New York

CC: Ben Tressler, Steiner NYC

SENT:

QUANTITY	CREATED ON	DESCRIPTION
1	March 7, 2014	Waste Characterization/Beneficial Re-Use Sampling Plan

COMMENTS

Mr. Greco

Enclosed is the referenced Sampling Plan for you information. Please call me if you have any questions.

Andrew Lockwood
Senior Project Manager

REDEVELOPMENT PROJECT
333 SCHERMERHORN STREET
BROOKLYN, NEW YORK
OER PROJECT # 12EH-N390K

WASTE CHARACTERIZATION/BENEFICIAL RE-USE SAMPLING PLAN

Submitted To:

New York City Office of Environmental Remediation
E-Designation Program
100 Gold Street, 2nd Floor
New York, New York 10038

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York

Prepared For:

HUB Associates, LLC
15 Washington Avenue
Brooklyn Navy Yard
Brooklyn, New York 11205

Prepared By:

P.W. Grosser Consulting, Inc.
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PWGC Project Number: STT1401

MARCH 2014

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1.0 INTRODUCTION

P.W. Grosser Consulting, Inc. (PWGC) has prepared the plan to detail the procedures for evaluating soils for waste characterization / beneficial Re-Use for the property located at 333 Schermerhorn Street in Brooklyn, New York.

2.0 SITE DESCRIPTION AND BACKGROUND

The subject site is 333 Schermerhorn Street Brooklyn, NY (Block 167; Lot 13). The subject site is a lot that measures approximately 52,736 square feet in size and is currently vacant with no improvements. An “E” Designation for Hazardous Materials (E-124) was placed on the site by the New York City Department of City Planning (DCP) as part of the June 28, 2004, Downtown Brooklyn rezoning action (CEQR number 03DME016K). This project has been assigned project number 12EH-N390K by New York City Office of Environmental Remediation (OER).

Redevelopment plans for the site include the construction of a 54-story mixed-use building with a cellar level and an elevator pit. The cellar will incorporate approximately 81% of the lot and will be utilized for parking, storage, mechanical use, and will also contain employee facilities. The ground level will contain the tenant lobby and retail space. The elevator pit will encompass the entire tower.

A subsurface investigation was performed at the site by PWGC in July of 2012. Soil/fill samples collected during the investigation showed elevated levels of Semi-Volatile Organic Compounds (SVOCs), pesticides, and metals in shallow soils, indicative of historic fill material. In addition, elevated lead was identified at 9,900 parts per million (ppm) in shallow soil (0-2‘ below ground surface (bgs) collected from SB006 located on previous lot 50. The sample was analyzed for TCLP metals and lead was detected above the level for classification as a hazardous waste. The Area of lead contamination was further delineated and found to be isolated to a small area (20ft x 20ft x 4ft deep) at the western side of the site (former Lot 50). This area of soil will be removed and disposed of separately.

A Remedial Action Plan was developed by PWGC for the site in November of 2012 and approved by OER on February 14, 2013.

3.0 Waste Characterization / Beneficial Re-Use Sampling

This Sampling plan has been developed to identify sampling locations, frequency, and analytical parameters which will be used to evaluate disposal / Re-Use options for site soils. The developer is evaluating several options for disposal / Re-Use which include potential Re-Use at a Brooklyn Navy Yard construction site and/or disposal at several Clean Earth facilities.

3.1 Proposed Excavation

The subject property is currently undeveloped. The former buildings were demolished in 2013 with only the building foundations and basement walls intact. Construction debris was utilized as shoring along the basement walls. The elevation across the site varies.

In order to estimate the volume of soil to be removed from the subject property, PWGC evaluated the current elevations across the site and the proposed elevations for the bottom of the foundation, including slab thickness. The estimated volume to be removed for construction is approximately 19,200 cubic yards (not including the debris used for shoring).

3.2 Sampling Requirements

In order to determine if soils are acceptable for Re-Use at the Brooklyn Navy Yard Facility, the sampling frequency and analytical requirements will be in accordance with Table 5.4(e)10 of New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER), *DER-10 Technical Guidance for Site Investigation and Remediation*, My 2010.

Table 5.4(e)10
Recommended Number of Soil Samples for Soil Import To or Exported From a Site

Contaminant	VOC	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (CY)	Discrete Samples	Composite	Discrete Samples / Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
> 1000	Add an additional 2 VOC and 1 composite for each additional 1000 CY or consult with DER		

In addition, waste characterization will be performed following the sampling frequency and analytical requirements for the Clean Earth Facilities. These requirements are included in **Appendix A**.

3.3 Excavation / Sampling Grid

The development of the site will involve excavations across the entire site at varying elevations. In order to evaluate the soil in various horizons, the site has been divided into eight grids that have the same finished elevation.

Grid	Estimated Volume (CY)	Excavation Limits (elevation ft)
1	2,160.60	EL 41' - 25' (16 feet)
2	4,776.13	EL 30' – 9' (21 feet)
3	2,304.40	EL 40' – 28' (12 feet)
4	1,033.07	EL 32' – 28' (4 feet)
5	2,789.33	EL 40' – 28' (12 feet)
6	1,895.59	EL 39' – 21' (18 feet)
7	3,777.76	EL 39' – 21' (18 feet)
8	767.20	EL 39' – 35' (4 feet)

3.4 Sampling Protocol

Waste characterization / beneficial Re-Use samples will be collected utilizing Geoprobe Systems® technical drilling machines. The drilling machine relies on a relatively small amount of static (vehicle) weight combined with percussion as the energy for advancing a tool string. Direct push tools do not remove cuttings from the probe hole but depend on compression of soil or rearrangement of soil particles to permit advancement for the tool string. Direct push tools are advanced as far as possible using only the static weight of the carrier vehicle. Percussion is applied as required when probing through sands, gravels, hard pans, high friction clays, tills, fill materials, and surface frost. This drilling method will allow for the collection of grab samples from various depths which will provide samples from discrete horizons for analysis. Geoprobe Systems® technical sheets are included in **Appendix B**.

Sampling will be performed across the site in a grid pattern (approximately 800 cubic yards in volume) so representative samples of the material to be removed from the site are collected. The grids have been divided into several layers so that the individual horizons (shallow (**Figure 2A**), intermediate (**Figure 2B**), and deep (**Figure 2C**)) can be evaluated to determine disposal / Re-Use options. The Table below details the sample horizons that are proposed for characterization.

Grid	# Depth Intervals	# Composite Samples / Interval
1	EL 41-33’	2
	EL 33-25’	2
2	EL 30-23’	2
	EL 23-16’	2
	EL 16-9’	2
3	EL 40-34’	2
	EL 34-28’	2
4	EL 32-28’	2
5	EL 40-34’	2
	EL 34-28’	2
6	EL 39-30’	2
	EL 30-21’	1
7	EL 39-30’	3
	EL 30-21’	2
8	EL 39-35’	1

Figure 2A through **Figure 2C** illustrates the locations of the proposed borings which will be utilized to collect samples across the site. As shown on the figure, several soil borings are located within the New York City Transit Authority subway tunnel easement that intersects the site. **Figures 3** and **4** illustrate cross sectional diagrams of the site which shows surface elevation grade, high and low easement elevations and the proposed borings. The proposed borings will be a minimum of eight feet away from the top of the subway tunnel.

Samples collected for waste characterization/beneficial re-use purposes will be submitted to a New York State Department of Health Services (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certified laboratory and a New Jersey Department of Environmental Protection certified laboratory for analysis of the following:

- Total Volatile Organics (TCL +10 & NJDEP SCC List + NJDEP SRS List) by EPA Method 8260C – with EnCore sampling device
- Extractable Petroleum Hydrocarbon (non-fractionated) - EPA Method 3546 / NJDEP EPH
- TPH Extended Range Organics – EPA Method 8015C(M)
- TPH – NJDEP OQA-QAM 025
- Total Semi-Volatile Organics (TCL + 20 & NJDEP SCC List + NJDEP SRS List) by EPA Method 8270D
- Total Cyanide by EPA Method 9010C
- TAL Metals & Hexavalent Chromium and Mercury by EPA Method 6010C/3060A
- TCLP Metals (8 RCRA) by EPA Method 1311/6010C/7470A
- PCBs by EPA Method 8082A
- Total Pesticides (TCL + NJDEP SCC List & NJDEP SRS List) by EPA Method 8081B
- RCRA Characteristics (Ignitability, Corrosivity, Reactivity (CN/S)) by EPA Method 1010A/9045C/SW846 Ch7.3

In order to evaluate sampling quality and laboratory precision, quality assurance / quality control (QA/QC) procedures will be followed and will include the analysis of one field blank, one MS/MSD, and one equipment blank for every 10 samples.

3.5 Waste Characterization / Beneficial Re-Use Documentation

Following the receipt of laboratory analytical reports, a data summary package will be prepared and submitted to NYSDEC and NYCOER for review.

4.0 Community Air Monitoring / Construction Health and Safety

During soil sampling, the onsite environmental representative will act as the health and safety officer. The health and safety officer will document that the requirements described in the approved Community Air Monitoring Plan (CAMP) and Construction Health and Safety Plan (CHASP) are followed. Specifically, the health and safety officer will be responsible for the following tasks:

- Document that project personnel are familiar with the project specific health and safety requirements;
- Conduct daily tailgate safety meetings;
- Monitor samples and site perimeters for organic vapors using a photo-ionization detector (PID); and
- Conduct periodic dust monitoring using a DustTrak 8520 aerosol dust monitor (or equivalent) in accordance with the CAMP.

FIGURES

NYC TRANSIT GENERAL NOTES:

1. THE NYC TRANSIT (NYCT) RESERVES THE RIGHT TO PLACE INSPECTORS, FLAGMEN OR OTHER PERSONNEL IN THE SUBWAY STRUCTURES DURING CONSTRUCTION OF THE PROJECT LINKED BY A TELEPHONE SYSTEM, IF DEEMED NECESSARY, TO OBSERVE THE EFFECTS OF THE CONSTRUCTION ON THE TRANSIT FACILITIES. IT IS EXPECTED THAT SUCH PERSONNEL WILL BE NECESSARY WHEN THE CONSTRUCTION COMES WITHIN TWENTY-FIVE FEET OF THE SUBWAY STRUCTURE. HOWEVER, THE NYCT FURTHER RESERVES THE RIGHT TO PLACE SUCH PERSONNEL WHENEVER, IN ITS OPINION , THE PROJECT CONDITIONS WARRANT SUCH PLACEMENT, REGARDLESS OF DISTANCE. THE COST OF SUCH PERSONNEL, TELEPHONE INSTALLATION AND ANY RE-ROUTES, DIVERSIONS OF SERVICE, WORK TRAINS, ETC., MADE NECESSARY BY THE PROJECT, MUST BE BORNE BY THE PROJECT OR THE RESPONSIBLE NEW YORK CITY/ STATE AGENCY.

2. ALL ROCK EXCAVATION ADJACENT TO THE TRANSIT STRUCTURE IS TO BE CHANNEL DRILLED TWO FEET BELOW SUBGRADE.

3. IF TOP OF ROCK IS FOUND BELOW SUBWAY STRUCTURE, THE SUBWAY STRUCTURE MUST BE UNDERPINNED IN ACCORDANCE WITH DRAWINGS TO BE SUBMITTED TO THE NYCT FOR APPROVAL.

4. IF ROCK IS SOFT OR SEAMY, LATERAL SUPPORTS MUST BE PROVIDED BELOW THE SUBWAY STRUCTURE IN ACCORDANCE WITH DRAWINGS TO BE SUBMITTED TO THE NYCT FOR APPROVAL.

5. BLASTING WILL BE PERMITTED ONLY WITH LIGHT CHARGES SUBJECT TO THE APPROVAL OF NYCT'S ENGINEER AND IN ACCORDANCE WITH THE REGULATIONS OF THE FIRE DEPARTMENT. THE CONTRACTOR SHALL PROVIDE A DETAILED MONITORING PLAN, PROVIDING FOR MEASUREMENTS OF BOTH PARTICLE VELOCITY AND DISPLACEMENTS AT CRITICAL LOCATIONS OF THE NYCT STRUCTURE. THE MONITORING PLAN SHALL INCLUDE THRESHOLD AND UPSET LEVELS OF BOTH PARTICLE VELOCITY AND SETTLEMENT TOGETHER WITH AN ACTION PLAN FOR THEIR IMPLEMENTATION. THE CONTRACTOR SHALL SECURE AN APPROVED SEISMOLOGISTS TO INSTALL AND OPERATE SUITABLE VELOCITY GAUGES TO CONTINUOUSLY MONITOR PARTICLE VELOCITY AND AN INDEPENDENT LICENSED SURVEYOR TO MONITOR DISPLACEMENTS. THE THRESHOLD MAXIMUM PARTICLE VELOCITY ABOVE AMBIENT CAUSED BY THE BLASTING WILL BE 0.5 INCH PER SECOND. VALUES EXCEEDING THIS LEVEL WILL BE REVIEWED AND EVALUATED BY NYCT'S ENGINEER. IN NO CASE WILL PARTICLE VELOCITIES EXCEED THEUPSET LEVEL OF 2.0 INCHES PER SECOND.

6. BEFORE PLACING CONCRETE, THE SUBGRADE OF THE FOUNDATIONS IN THE VICINITY OF THE SUBWAY STRUCTURE IS TO BE INSPECTED AND APPROVED BY THE NYCT'S ENGINEER.

7. IF ANY PORTION OF THE SUBWAY STRUCTURE OR FINISH IS DAMAGED, IT SHALL BE REPAIRED OR REPLACED WITH THE SAME MATERIALS IN PLACE, SUBJECT TO THE APPROVAL OF THE NYCT'S ENGINEER AND AT THE EXPENSE OF THE PROJECT.

8. EXCAVATION EMBANKMENTS ARE TO BE SHORED AND BRACED. DRAWINGS INDICATING A SUGGESTED METHOD OF CONSTRUCTION ARE TO BE SUBMITTED TO THE NYCT FOR APPROVAL IN CONJUNCTION WITH THE PROJECTS CONTRACT DRAWINGS. IN CASE OF EXCAVATION UNDERMINING THE SUBWAY STRUCTURE, UNDERPINNING MAY BE REQUIRED. DRAWINGS FOR UNDERPINNING ARE TO BE SUBMITTED TO NYCT FOR APPROVAL.

9. TEMPORARY SHORING MAY BE PLACED IN DIRECT CONTACT WITH NYCT STRUCTURES ONLY IF THE NYCT STRUCTURE IS SHOWN TO BE ABLE TO SUPPORT ALL ANTICIPATED LOADS THAT CAN BE TRANSFERRED THROUGH THE TEMPORARY STRUCTURES WITHOUT DAMAGING THE EXISTING STRUCTURE. AT THE COMPLETION OF THE PROJECT, THESE TEMPORARY SHORING AND BRACING SYSTEMS ARE TO BE REMOVED OR CUT-OFF AS APPROVED BY NYCT.

10. WHEN PILES ARE TO BE DRIVEN ADJACENT TO THE SUBWAY STRUCTURE, BORING DATA, PILE LAYOUTS, SPECIFICATIONS AND INSTALLATION PROCEDURES ARE TO BE SUBMITTED TO NYCT FOR APPROVAL. VELOCITY METERS ARE TO BE INSTALLED IN THE SUBWAY TUNNEL AT CRITICAL LOCATIONS TO MONITOR INDUCED VIBRATIONS. INDUCED DISPLACEMENTS ALONG THE TUNNEL STRUCTURE AND TRACK INVERT ARE TO BE MONITORED DURING DRIVING. THE THRESHOLD MAXIMUM PARTICLE VELOCITY ABOVE AMBIENT CAUSED BY THE DRIVING WILL BE 0.5 INCH PER SECOND. VALUES EXCEEDING THIS LEVEL WILL BE REVIEWED AND EVALUATED BY NYCT'S ENGINEER. IN NO CASE WILL PARTICLE VELOCITIES EXCEED THE UPSET LEVEL OF 2.0 INCHES PER SECOND.

11. NO PILES ARE PERMITTED TO BE INSTALLED BY ANY METHOD WITHIN THREE FEET OF SUBWAY STRUCTURE, MEASURED FROM THE EDGE OF THE PILE OR CASING TO THE WALL. CLOSED-END PILES WILL NOT BE PERMITTED TO BE DRIVEN WITHIN TEN FEET OF THE SUBWAY STRUCTURE.

12. ALL PILES ARE TO BE PLACED WITHIN A PREAUGERED CASED HOLE TO THE INFLUENCE LINE. THE CASING SHALL BE CLEANED WITHOUT DISTURBING THE SOIL OUTSIDE THE CASING AND THE PILE TO BE PLACED WITHIN THE CASING FOR INSTALLATION. THE PILES MAY THEN BE DRIVEN BEYOND THE INFLUENCE LINE WITHIN THE CASING.

13. THE INFLUENCE LINE SHALL START AT THE BOTTOM OF THE SUBWAY STRUCTURE AND EXTEND AT A 1:1 SLOPE. FOR PILES INSTALLED WITHIN TEN FEET OF THE SUBWAY STRUCTURE, THE CASING SHALL BE EXTENDED UP TO THE BOTTOM OF THE SUBWAY STRUCTURE.

14. AT THE COMPLETION OF PILE INSTALLATION, THE SPACE BETWEEN THE PILE AND THE CASING IS TO BE FILLED WITH EITHER CLEAN SAND OR GROUT. IF THE CASING IS TO BE REMOVED, THE FILLING MUST BE COMPLETED PRIOR TO REMOVAL OF THE CASING.

15. ALL PILES ARE TO BE DRIVEN A MINIMUM OF TEN FEET BELOW THE INTERSECTION OF THE PILE CENTERLINE AND THE INFLUENCE LINE OF THE SUBWAY STRUCTURE.

16. THE USE OF "DOWN-THE-HOLE-HAMMERS" FOR THE INSTALLATION OF PILES THROUGH OVERBURDEN AND FILL WILL BE PERMITTED ONLY TO REMOVE BOULDERS. IT WILL NOT BE PERMITTED AS A MATTER OF COURSE TO ADVANCE THE HOLE. THEIR USE TO CONSTRUCT ROCK SOCKETS WILL NOT BE ALLOWED WITHIN 5 FEET OF THE NYCT STRUCTURE.

17. VIBRATORY HAMMERS WILL NOT BE PERMITTED WITHIN 75 FEET OF SUBWAY STRUCTURES. HOERAMS WILL NOT BE PERMITTED WITHIN 25 FEET OF THE SUBWAY STRUCTURES.

18. DYNAMIC COMPACTION METHODS USING DROPPED HEAVY WEIGHTS CANNOT BE CONDUCTED WITHIN 1000 FEET OF ANY NYCT STRUCTURE UNLESS IT IS SHOWN THAT INDUCED SETTLEMENTS AND VIBRATIONS WILL NOT DAMAGE THESE STRUCTURES. A SUITABLE MONITORING PLAN INCLUDING SETTLEMENT AND VIBRATION MEASUREMENTS MUST BE APPROVED BY NYCT'S ENGINEER FOR ALL SUCH OPERATIONS WITHIN THESE DISTANCES.

19. THERE SHALL BE NO MACHINE EXCAVATION WITHIN 3 FEET OF NYCT STRUCTURES, POWER DUCT LINES, OR ANY OTHER FACILITIES UNTIL THEY HAVE BEEN CAREFULLY EXPOSED BY HAND EXCAVATION.

20. ALL DEWATERING OPERATIONS CONDUCTED WITHIN 500 FEET OF THE NYCT STRUCTURE MUST BE PERFORMED IN ACCORDANCE WITH DRAWINGS AND PROCEDURES SUBMITTED TO NYCT FOR APPROVAL. THE DISTANCE FROM THE STRUCTURE TO THE DEWATERING OPERATION CAN BE REDUCED PROVIDED THAT SOIL CONDITIONS AT THE SITE INDICATE THAT THE RADIUS OF INFLUENCE OF THE DEWATERING IS LESS THAN 500 FEET. FOR DEWATERING WITHIN THE RADIUS OF INFLUENCE, THE DEWATERING PROGRAM MUST BE SHOWN TO HAVE NEGLIGIBLE INFLUENCE ON SETTLEMENTS OF THE NYCT STRUCTURE.

21. SUBWAY ENTRANCES (VENTILATORS, ETC.) ARE TO BE UNDERPINNED OR SHORED AND BRACED IF DIRECTED BY NYCT'S ENGINEER.

22. NYCT, AT ITS DISCRETION, RESERVES THE RIGHT TO REQUIRE THE PROJECT TO CLOSE OR MAINTAIN AND PROTECT EXISTING SUBWAY ENTRANCES, VENTILATORS, ETC. ADJACENT TO THE PROJECT DURING CONSTRUCTION. SUCH CONSTRUCTION MAY INCLUDE UNDERPINNING, SHORING, BRACING AND ERECTION OF SUITABLE BARRICADES AND/OR CANOPIES AND SHIELDS. SUCH PROTECTION SHALL BE IN ACCORDANCE WITH DRAWINGS SUBMITTED TO NYCT FOR APPROVAL.

23. IF SHIELDS ARE TO BE INSTALLED TO PROTECT NYCT FACILITIES AND/OR THE PUBLIC, PLANS SHOWING THE LOCATION, TYPE AND METHOD OF ATTACHMENT TO THE TRANSIT STRUCTURE MUST BE SUBMITTED TO NYCT FOR APPROVAL.

24. ALL LUMBER AND PLYWOOD USED FOR PROTECTION OF SUBWAY FACILITIES MUST BE FIRE RETARDANT.

25. SUBWAY EMERGENCY EXITS MUST BE KEPT CLEAR AT ALL TIMES.

26. IN EXCAVATING OVER OR NEAR THE SUBWAY ROOF, SPECIAL CARE SHALL BE EXERCISED SO THAT THE THIN CONCRETE PROTECTION OF THE SUBWAY WATERPROOFING IS NOT DAMAGED.

27. BURNING OF, WELDING TO OR DRILLING THROUGH EXISTING STEEL STRUCTURES WILL NOT BE PERMITTED EXCEPT AS SHOWN ON DRAWINGS APPROVED BY NYCT.

28. HORIZONTAL AND VERTICAL CONTROL SURVEY DATA OF THE EXISTING NYCT STRUCTURE IS TO BE TAKEN BY A LICENSED LAND SURVEYOR TO MONITOR ANY MOVEMENTS THAT OCCUR DURING CONSTRUCTION AND TO SHOW THAT THE INDUCED MOVEMENTS ARE WITHIN ALLOWABLES PROVIDED AND APPROVED BY NYCT'S ENGINEER. IF ANY MOVEMENTS EXCEED ALLOWABLES, REMEDIATION AS APPROVED BY NYCT SHALL BE PERFORMED.

29. BUS ROUTES AFFECTED BY THE PROJECT WILL OR MAY REQUIRE BUS DIVERSIONS. THESE ARRANGEMENTS SHALL BE MADE THROUGH:

MS. SARAH WYSS
ACTING DIRECTOR, OPERATIONS PLANNING
NEW YORK CITY TRANSIT
2 BROADWAY, ROOM A17.82
NEW YORK, NEW YORK 10004
TELEPHONE NUMBER 646/252-5517

WHEN IMPACTING ANY BUS STOP, SPECIAL OPERATIONS MUST BE NOTIFIED TWO WEEKS IN ADVANCE.

30. DUCT LINES MUST BE MAINTAINED AND PROTECTED DURING CONSTRUCTION. ANY INTERFERENCE WITH DUCT LINES SHOULD BE REPORTED TO NYCT INSPECTOR. WHEN A DUCT LINE CONTAINING CABLES IS TO BE REMOVED, OR WHEN MASONRY ADJACENT THERETO IS TO BE REMOVED, PENETRATED, OR DRILLED, THE WORK SHALL BE DONE WITH HAND LABOR ENTIRELY, USING HAMMER AND CHISEL. JACKHAMMERS, BULL POINTS OR OTHER POWER EQUIPMENT SHALL NOT BE USED.

31. WHERE MANHOLES ARE ENCOUNTERED:

A) THEY SHALL BE PROTECTED AND RAISED OR LOWERED AS REQUIRED, TO MATCH THE NEW STREET GRADE.
B) IF MANHOLE COVERS ARE RAISED OR LOWERED, PROTECT CABLES IN MANHOLE BY WOOD SHEETING OF 2" NOMINAL THICKNESS.
C) PRIOR TO THE START OF CONSTRUCTION OPERATIONS AFFECTING MANHOLES AND DUCT LINES, SEVEN DAYS NOTICE MUST BE GIVEN TO MR. JOHN MALVASIO, P.E., DIRECTOR, DEPARTMENT OF MAINTENANCE OF WAY, AT 718/694-1358

32. CONSTRUCTION WORK DONE NEAR VENT GRATINGS AND HATCHES SHALL BE AS FOLLOWS:

A) UNLESS APPROVED BY NYCT'S ENGINEER, ALL VENT GRATINGS AND HATCHES SHOULD REMAIN OUTSIDE THE CONSTRUCTION SITE, SEPARATED BY A CONSTRUCTION FENCE. PROTECTIVE SHIELDS MUST BE PROVIDED OVER VENT GRATINGS AS REQUIRED BY NYCT'S ENGINEER.
B) NO BUILDING MATERIAL, VEHICLES OR CONSTRUCTION EQUIPMENT IS TO BE STORED OR RUN OVER VENT, GRATINGS, HATCHES OR EMERGENCY EXITS.
C) DETAILS OF SIDEWALK RECONSTRUCTION AROUND VENT GRATINGS, HATCHES AND EMERGENCY EXITS ARE TO BE SUBMITTED TO NYCT FOR APPROVAL.

33. TRACTORS, CRANES, EXCAVATORS, ETC. USED IN THE VICINITY OF THE ELEVATED STRUCTURES SHALL BE ISOLATED FROM THE GROUND. SINCE THE ELEVATED STRUCTURE IS USED AS A NEGATIVE RETURN PATH, WITH A CONSEQUENT POTENTIAL BETWEEN IT AND THE GROUND, ANY CONTACT BETWEEN THE STRUCTURE AND THE GROUNDED EQUIPMENT COULD RESULT IN BURNING OF THE STEEL.

34. TEMPORARY CONSTRUCTION SHEDS, BARRICADES OR PLYWOOD PARTITIONS MUST BE A MINIMUM OF 5'-0" FROM EDGE OF FINISHED PLATFORM.

35. STATION AREAS OR STAIRWAY/CLOSINGS: THE GENERAL REQUIREMENTS FOR STATION AREAS OR STAIRWAY/CLOSINGS ARE AS FOLLOWS:

A) ONLY ONE STAIRWAY AT EACH STATION WILL BE PERMITTED TO BE CLOSED AT THE SAME TIME. APPROVALS FOR CLOSING ANY STAIRWAY MUST BE OBTAINED FROM THE DIVISION OF STATION OPERATIONS AT LEAST THREE WEEKS IN ADVANCE.
B) MR. ASHOK PATEL, DIRECTOR, OFFICE OF STATION PROGRAMS; TELEPHONE (718) 694-1695 THE DIVISION OF STATIONS MUST BE NOTIFIED ONE WEEK PRIOR TO THE ACTUAL CLOSING AND REOPENING OF THE ENTRANCE.
C) AMPLE SIGNAGE MUST BE SUPPLIED AND POSTED AT LEAST ONE WEEK IN ADVANCE, ADVISING THE PUBLIC OF THE PROPOSED SUBWAY STAIR CLOSING.
D) THE STREET ENTRANCE STAIRWAY SHOULD NOT BE CLOSED UNLESS MANPOWER AND MATERIALS ARE AVAILABLE TO COMMENCE WORK ON THE DATES PERMITTED.
E) ONCE THE CLOSING IS EFFECTED, CONSTRUCTION SIGNS MUST BE PLACED AT APPROPRIATE LOCATIONS ON THE BARRICADES AT THE STREET AND MEZZANINE LEVELS, STATING THE CONTRACTOR'S NAME, 24 HOUR EMERGENCY TELEPHONE NUMBER, CONTACT NUMBER, THE DURATION OF THE CLOSING, DIRECTION TO AN ALTERNATE ENTRANCE/EXIT, AND AN APOLOGY FOR THE INCONVENIENCE TO OUR CUSTOMERS.
F) EXISTING STATION SIGNAGE MUST BE ADJUSTED TO REFLECT ANY CHANGES IN ACCESS/EGRESS.
G) BARRICADES ARE TO BE PAINTED AND KEPT GRAFFITI FREE AT ALL TIMES. THE CONTRACTOR MUST MAINTAIN THE BARRICADE AREA CLEAN OF ALL DEBRIS.
H) ALL MATERIALS ARE TO BE PROPERLY STORED AND SECURED AWAY FROM PASSENGER TRAFFIC.
I) THE CONTRACTOR MUST REMOVE ALL WASTE MATERIAL AND BARRICADES FROM ALL STATION AREAS WHEN CONSTRUCTION IS COMPLETED.
J) INSPECTION OF THE AREA UNDER CONSTRUCTION BY AUTHORIZED STATION DEPARTMENT EMPLOYEES SHALL NOT BE INHIBITED.
K) IF STREETLIGHTS ON THE SIDEWALKS ARE AFFECTED, TEMPORARY LIGHTS SHALL BE PROVIDED.

36. IF NEW CONCRETE CONSTRUCTION IS JOINED TO EXISTING CONCRETE, DOWELS AND KEYWAYS ARE TO BE USED IN ACCORDANCE WITH NYCT STANDARDS.

37. IF THE PROJECT INVOLVES CONSTRUCTION OR ALTERATION OF A SUBWAY FACILITY ON PRIVATE PROPERTY, THE PROPERTY OWNERS WILL BE REQUIRED TO ENTER INTO AN AGREEMENT WITH THE NYCT PERTAINING TO ALL WORK AFFECTING THE TRANSIT FACILITIES AND CLEARLY DEFINING LIMITS AND RESPONSIBILITY FOR MAINTENANCE AND LIBILITY.

38. WHEREVER A NEW SIDEWALK IS BEING PLACED ADJACENT TO NYCT STRUCTURES THE FOLLOWING WILL BE REQUIRED:

A) THE TOP OF THE NEW SIDEWALK SHALL BE FLUSH WITH THE SUBWAY VENT GRATINGS, HATCHES AND EMERGENCY EXITS.
B) THE SLOPE OF THE NEW SIDEWALK SHALL BE SUCH THAT THE DRAINAGE BE AWAY FROM THESE STRUCTURES.
C) A ½" PREMOLDED FILLER SHALL BE INSTALLED BETWEEN THE NEW SIDEWALK AND NYCT STRUCTURE.
D) WHERE SIDEWALK ELEVATIONS ARE BEING CHANGED DETAILS OF PROPOSED WORK AROUND NYCT STRUCTURES ARE TO BE SUBMITTED FOR APPROVAL.

39. BEFORE THE START OF ANY WORK, THE CONTRACTOR SHALL MAKE AN EXAMINATION, IN THE PRESENCE OF NYCT'S ENGINEER, OF THE INTERIOR AND EXTERIOR OF NYCT SUBWAY OR OTHER STRUCTURE ADJACENT TO THE PROPOSED WORK. THE PERSON OR PERSONS AUTHORIZED BY THE CONTRACTOR TO MAKE THESE EXAMINATIONS SHALL BE APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL TAKE ALL PHOTOGRAPHS AS MAY BE NECESSARY OR ORDERED TO INDICATE THE EXISTING CONDITION OF NYCT STRUCTURE. ONE COPY OF EACH PHOTOGRAPH, EIGHT INCHES BY TEN INCHES IN SIZE, AND THE NEGATIVE IS TO BE SUBMITTED TO MR. JOHN MALVASIO, P.E., DIRECTOR, DEPARTMENT OF MAINTENANCE-OF-WAY, 130 LIVINGSTON STREET, ROOM 8044D, BROOKLYN, NEW YORK 11201, TELEPHONE 718/694-1358 BEFORE THE START OF CONSTRUCTION.

40. ALL ARCHITECTURAL DETAILS (TOKEN BOOTHS, RAILINGS, DOORS, ETC.) ARE TO CONFORM TO THE LATEST NYCT STANDARDS. THESE STANDARDS ARE AVAILABLE AT NYCT.

41. STANDARD NYCT INSURANCE CLAUSES ARE TO BE MADE PART OF THE PROJECTS CONTRACT DRAWINGS. PROOF THAT THE NECESSARY INSURANCE IS IN EFFECT WILL BE REQUIRED BEFORE WORK CAN COMMENCE.

42. AT THE CLOSE OF ANY PROJECT INVOLVING CONSTRUCTION OR ALTERATIONS TO TRANSIT FACILITIES, ONE SET OF VELLUMS OR MYLARS, FIVE SETS OF 35mm MICROFILM, AND ELECTRONIC COPIES COMPLYING TO MICROSTATION.DGN FORMAT OF "APPROVED AS-BUILTS" MUST BE PROVIDED TO NYCT FOR ITS RECORDS. FOR DETAILS OF SPECIFIC REQUIREMENTS CONTACT NYCT OUTSIDE PROJECTS.

43. AT LEAST SEVEN WORKING DAYS PRIOR TO THE START OF CONSTRUCTION OPERATIONS, NOTIFICATION MUST BE GIVEN TO MR. JOHN MALVASIO, P.E., DIRECTOR, DEPARTMENT OF MAINTENANCE-OF-WAY, AT 718/694-1358. THE CONTRACTOR TO PROVIDE TEMPORARY QUARTERS NEAR THE JOB SITE FOR NYCT INSPECTORS CONTAINING A DESK AND TELEPHONE.

DATUM CONVERSION TABLE

TRANSIT AUTHORITY DATUM 0.00' = BOROUGH OF BROOKLYN EL

PROJECT ELEVATION	TRANSIT AUTHORITY ELEVATION
0'-0"	99'-10⅞"
27'-0"	126'-10⅞"
27'-6"	127'-4⅞"
29'-0"	128'-10⅞"
30'-0"	129'-10⅞"
38'-0"	137'-10⅞"
38'-10"	138'-8⅞"
39'-4"	139'-2⅞"
39'-9"	139'-7⅞"
39'-10"	149'-8⅞"
41'-6"	141'-4⅞"
41'-9"	141'-7⅞"
41'-10"	141'-8⅞"

TRANSIT AUTHORITY REFERENCE DRAWINGS

ROUTE NO. 107 — SECTION NO. 6

FILE	DRAWING NO.
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NY TRANSIT AUTHORITY PERMANT EASEMENT

PLAN FOR B.O. BROOKLYN SECTION NO. 1, BLOCK NO. 167

RESPONSIBILITY OF THE CONTRACTOR

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE SAFETY AND PROTECTION OF THE RAPID TRANSIT SUBWAY LINES AND OF ALL PASSENGERS, PERSONS, OR EMPLOYEES AND OF ALL PROPERTY THEREON.

(a) THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL INJURIES (INCLUDING DEATH) TO PERSONS (INCLUDING, BUT NOT LIMITED TO, EMPLOYEES OF THE CONTRACTOR AND SUBCONTRACTORS AND EMPLOYEES OF THE CITY OF NEW YORK (HEREINAFTER CALLED THE CITY) OR THE NEW YORK CITY TRANSIT AUTHORITY (HEREINAFTER CALLED THE AUTHORITY) OR DAMAGE TO PROPERTY (INCLUDING, BUT NOT LIMITED TO, PROPERTY OF THE CITY, THE AUTHORITY OR THE CONTRACTOR OR SUBCONTRACTORS) OCCURRING ON ACCOUNT OF OR IN CONNECTION WITH PERFORMANCE OF THE WORK HEREUNDER AND SHALL INDEMNIFY AND SAVE HARMLESS THE CITY AND THE AUTHORITY FROM LOSS AND LIABILITY UPON ANY AND ALL CLAIMS ON ACCOUNT OF SUCH INJURIES TO PERSONS OR DAMAGE TO PROPERTY, AND FROM ALL COSTS AND EXPENSES IN SUITS WHICH MAY BE BROUGHT AGAINST THE CITY AND/OR THE AUTHORITY ON ACCOUNT OF ANY SUCH INJURIES TO PERSONS OR DAMAGE TO PROPERTY, IRRESPECTIVE OF THE ACTUAL CAUSE OF THE ACCIDENT AND IRRESPECTIVE OF WHETHER IT SHALL HAVE BEEN DUE TO NEGLIGENCE OF THE CONTRACTOR OR HIS SUBCONTRACTORS OR NEGLIGENCE OF THE CITY OR THE AUTHORITY, THEIR RESPECTIVE AGENTS, SERVANTS OR EMPLOYEES, OR OF ANY OTHER PERSON, BUT EXCEPTING INJURIES AND PROPERTY DAMAGE CAUSED BY OR RESULTING FROM THE SOLE NEGLIGENCE OF THE CITY AND/OR THE AUTHORITY ACTING AS AGENT OF THE CITY HEREUNDER. THE TERM "LOSS AND LIABILITY", AS USED ABOVE, SHALL BE DEEMED TO INCLUDE, BUT NOT LIMITED TO, LIABILITY FOR THE PAYMENT OF WORKER'S COMPENSATION BENEFITS UNDER THE WORKER'S COMPENSATION LAW OF THE STATE OF NEW YORK, AND THE CONTRACTOR SPECIFICALLY COVENANTS TO REIMBURSE THE AUTHORITY AND THE CITY FOR ALL PAYMENTS OF WORKER'S COMPENSATION BENEFITS, INCLUDING BUT NOT LIMITED TO BENEFITS PAID TO EMPLOYEES OF THE AUTHORITY AND THE CITY WHICH THE AUTHORITY OR THE CITY SHALL BE REQUIRED TO MAKE TO ANY EMPLOYEE WHO SHALL CLAIM TO HAVE SUSTAINED INJURIES ON ACCOUNT OF OR IN CONNECTION WITH THE WORK HEREUNDER, WHETHER OR NOT SUCH INJURIES SHALL HAVE BEEN SUSTAINED AS A RESULT OF NEGLIGENCE OF THE INJURED EMPLOYEE, BUT EXCEPTING BODILY INJURIES AND PROPERTY DAMAGE CAUSED BY OR RESULTING FROM THE SOLE NEGLIGENCE OF THE CITY AND/OR THE AUTHORITY ACTING AS AGENT OF THE CITY HEREUNDER.

(b) THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE SUPPORT, MAINTENANCE, SAFETY AND PROTECTION OF THE TRANSIT FACILITIES OF THE NEW YORK CITY TRANSIT SYSTEM (HEREINAFTER CALLED THE RAILROAD) AND FOR THE SAFETY AND PROTECTION OF ALL PERSONS, PASSENGERS, INTENDING PASSENGERS OR EMPLOYEES AND OTHER PERSONS, AND OF ALL PROPERTY THEREIN, AND HE SHALL BE SOLELY RESPONSIBLE AND LIABLE FOR ANY INJURY AND DAMAGE THERETO AND FOR ALL INJURIES TO PERSONS OR DAMAGE TO PROPERTY THEREIN, OCCURRING ON ACCOUNT OF OR IN CONNECTION WITH THE PERFORMANCE OF OR UNDER THIS CONTRACT WHETHER DUE TO THE NEGLIGENCE, FAULT OR DEFAULT OF THE CONTRACTOR OR NOT.
THE CONTRACTOR SHALL FULLY PROTECT AND INDEMNIFY THE CITY AND THE AUTHORITY FROM LOSS AND FROM LIABILITY UPON ANY AND ALL CLAIMS ON ACCOUNT OF DAMAGE TO THE RAILROAD, OR ON ACCOUNT OF SUCH INJURIES TO PASSENGERS, INTENDING PASSENGERS, EMPLOYEES OR OTHER PERSONS OR DAMAGE TO PROPERTY, OR ON ACCOUNT OF INTERRUPTION OF TRAIN OPERATION, OR ON ACCOUNT OF ANY WORK DONE BY THE CONTRACTOR ON OR AFFECTING THE RAILROAD, AND FROM ANY COSTS AND EXPENSES IN SUITS WHICH MAY BE BROUGHT AGAINST THE CITY AND/OR THE AUTHORITY FOR SUCH INJURIES OR DAMAGE.

(c) IN CASE ANY DAMAGE SHALL OCCUR TO ANY PART OF THE RAILROAD ON ACCOUNT OF OR IN CONNECTION WITH THE WORK HEREUNDER, AND THE CONTRACTOR IS RESPONSIBLE THEREFORE PURSUANT TO PARAGRAPH (a) HEREOF, THE CITY AND/OR THE AUTHORITY SHALL HAVE THE RIGHT TO CAUSE SUCH DAMAGE TO BE REPAIRED AND CHARGE THE EXPENSE OF SUCH REPAIRS TO THE CONTRACTOR AND TO BE REIMBURSED FOR THE AMOUNT OF SUCH EXPENSE FROM ANY MONEYS DUE OR BECOMING DUE TO THE CONTRACTOR HEREUNDER.

(d) APPROVAL BY THE CHIEF ENGINEER, TRACK & STRUCTURES, OF THE METHODS OF DOING THE WORK OR THE FAILURE OF THE CHIEF ENGINEER, TRACK & STRUCTURES, TO CALL ATTENTION TO IMPROPER OR INADEQUATE METHODS OR TO REQUIRE A CHANGE IN METHODS OR TO DIRECT THE CONTRACTOR TO TAKE ANY PARTICULAR PRECAUTION OR TO REFRAIN FROM DOING ANY PARTICULAR THING SHALL NOT EXCUSE THE CONTRACTOR IN CASE OF ANY SUCH INJURY TO PERSON OR DAMAGE TO PROPERTY.

IT IS UNDERSTOOD AND AGREED THAT IF DURING THE COURSE OF THE WORK UNDER THIS CONTRACT, WATCHMEN, FLAGMEN AND OTHER EMPLOYEES OF THE CITY AND/OR THE AUTHORITY ARE ASSIGNED TO PERFORM WORK IN CONNECTION THEREWITH, SUCH EMPLOYEES ARE TO BE CONSIDERED AS EMPLOYEES OF THE CONTRACTOR.

(e) THE CONTRACTOR SHALL PROCURE, AT IT'S SOLE COST AND EXPENSE, AND SHALL MAINTAIN IN FORCE AT ALL TIMES UNTIL FINAL ACCEPTANCE BY THE AUTHORITY, POLICIES OF INSURANCE AS HEREIN BELOW SET FORTH, WRITTEN BY COMPANIES APPROVED BY THE AUTHORITY AND SHALL DELIVER TO THE AUTHORITY EVIDENCE OF SUCH POLICIES. A CERTIFICATE OF INSURANCE MAY BE SUPPLIED AS EVIDENCE OF SUCH POLICIES, HOWEVER IF REQUESTED BY THE AUTHORITY, THE CONTRACTOR SHALL DELIVER TO THE AUTHORITY A COPY OF SUCH POLICIES, CERTIFIED BY THE INSURANCE CARRIER AS BEING A TRUE AND COMPLETE COPY. THE CERTIFICATE OF INSURANCE AND INSURANCE POLICIES MUST (1) INDICATE THE I.S.O. FORM USED BY THE CARRIER; (2) BE SIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE BROKER OR THE INSURANCE CARRIER; (3) DISCLOSE ANY DEDUCTIBLES, SELF-INSURED RETENTION (DEDUCTIBLES OR SELF-INSURED RETENTIONS ABOVE $25000 DOLLARS WILL REQUIRE APPROVAL FROM THE AUTHORITY) AGGREGATE LIMIT OR ANY EXCLUSIONS TO THE POLICY THAT MATERIALLY CHANGE THE COVERAGE; (4) INDICATE THAT THE NYCTA, MABSTOA, SIRTOA, MTA, ITS SUBSIDIARIES AND AFFILIATED COMPANIES AND THE CITY OF NEW YORK AND ALL OTHER INDEMNIFIED PARTIES INCLUDED IN THE CONTRACT ARE NAMED AS ADDITIONAL INSUREDS ON ALL POLICIES (EXCEPT WORKER'S COMPENSATION OR PROFESSIONAL LIABILITY); (5) REFERENCE THE CONTRACT ON THE FACE OF THE CERTIFICATE; (6) INCLUDE A SPECIAL CANCELLATION PROVISION WHICH SHALL READ "THE AUTHORITY IS INTERESTED IN THE MAINTENANCE OF THIS INSURANCE, AND IT IS AGREED THAT THIS INSURANCE WILL NOT BE CANCELLED, MATERIALLY CHANGED OR NOT RENEWED WITHOUT AT LEAST 30 DAYS PRIOR WRITTEN NOTICE TO THE AUTHORITY, ATTENTION DIRECTOR – RISK MANAGEMENT, ROOM 10064, 130 LIVINGSTON STREET, BROOKLYN, NEW YORK 11201, BY CERTIFIED MAIL, RETURN RECEIPT REQUESTED"; AND (7) INDICATE THAT THE COVERAGE AFFORDED UNDER THE POLICIES SHALL APPLY AS PRIMARY AND NOT EXCESS OR CONTRIBUTING BASIS WITH ANY POLICIES WHICH MAY BE AVAILABLE TO THE AUTHORITY. AT LEAST TWO WEEKS PRIOR TO THE EXPIRATION OF THE ORIGINAL POLICIES OR ANY RENEWALS THEREOF, EVIDENCE OF RENEWAL OR REPLACEMENT POLICIES OF INSURANCE, WITH SAME TERMS AND LIMITS AS EXPIRING, SHALL BE DELIVERED TO THE AUTHORITY.

NOTE:
GENERAL CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH TRANSIT AUTHORITY REQUIREMENTS. THIS INCLUDES BUT IS NOT LIMITED TO INSURANCES, SURVEYS AND ANY REQUIRED PERSONNEL.

INSURANCE CLAUSES:

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE SAFETY AND PROTECTION OF THE RAPID TRANSIT SUBWAY LINES AND OF ALL PASSENGERS, PERSONS, OR EMPLOYEES AND OF ALL PROPERTY THEREON.

1. THE PERMITTEE AT ITS SOLE COST AND EXPENSE SHALL CARRY OR CAUSE TO CARRIED AND SHALL MAINTAIN AT ALL TIMES DURING THE PERIOD OF PERFORMANCE UNDER THIS AGREEMENT POLICIES OF INSURANCE AS HEREIN BELOW SET FORTH BELOW;

A. WORKERS' COMPENSATION INSURANCE (INCLUDING EMPLOYER'S LIABILITY INSURANCE) WITH LIMITS OF NOT LESS THAN $2,000,000, WHICH LIMIT MAY BE MET BY A COMBINATION OF PRIMARY AND EXCESS INSURANCE MEETING THE STATUTORY, LIMITS OF NEW YORK STATE. THE POLICY SHALL BE ENDORSED TO INCLUDE LONGSHOREMAN'S AND HARBOR WORKERS' COMPENSATION ACT/MARITIME COVERAGE ENDORSEMENT AND/OR JONES ACT ENDORSEMENT WHEN APPLICABLE.

B. COMMERCIAL GENERAL LIABILITY INSURANCE (I.S.O. 2001 FORM OR EQUIVALENT) APPROVED BY PERMITTOR IN THE PERMITTEE'S NAME WITH LIMITS OF LIABILITY IN THE AMOUNT OF AT LEAST $3,000,000 FOR EACH OCCURRENCE ON A COMBINED SINGLE LIMIT BASIS FOR INJURIES TO PERSONS (INCLUDING DEATH) AND DAMAGE TO PROPERTY, $3,000,000 GENERAL AGGREGATE AND $3,000,000 IN THE AGGREGATE WITH RESPECT TO PRODUCTS/COMPLETED OPERATIONS. THE LIMITS MAY BE PROVIDED IN THE FORM OF A PRIMARY POLICY OR COMBINATION OF PRIMARY AND UMBRELLA/EXCESS POLICY. WHEN THE MINIMUM CONTRACT AMOUNTS CAN ONLY BE MET WHEN APPLYING THE UMBRELLA/EXCESS POLICY, THE UMBRELLA/EXCESS POLICY MUST FOLLOW FORM OF THE UNDERLYING POLICY AND BE EXTENDED TO "DROP DOWN" TO BECOME PRIMARY IN THE EVENT PRIMARY LIMITS ARE REDUCED OR .AGGREGATE LIMITS ARE EXHAUSTED, SUCH INSURANCE SHALL BE PRIMARY, AND NON-CONTRIBUTORY TO ANY OTHER VALID AND COLLECTIBLE INSURANCE AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE. SUCH POLICY SHOULD BE WRITTEN ON AN OCCURRENCE FORM, AND SHALL INCLUDE:

- CONTRACTUAL COVERAGE FOR LIABILITY ASSUMED BY THE PERMITTEE UNDER THIS AGREEMENT;
- PERSONAL AND ADVERTISING INJURY COVERAGE;
- PRODUCTS-COMPLETED OPERATIONS;
- INDEPENDENT CONTRACTORS COVERAGE;
- "XCU" COVERAGE (EXPLOSION, COLLAPSE, AND UNDERGROUND HAZARDS) WHERE NECESSARY;
- CONTRACTUAL LIABILITY EXCLUSION, APPLICABLE TO CONSTRUCTION OR DEMOLITION OPERATIONS TO BE PERFORMED WITHIN.50. FEET OF RAILROAD TRACKS, MUST BE VOIDED, WHERE NECESSARY; AND ADDITIONAL INSURED ENDORSEMENT (I.S.O. FORM CG 20 26 07/04 VERSION OR EQUIVALENT) APPROVED BY THE PERMITTOR NAMING: NEW YORK CITY TRANSIT AUTHORITY (NYCTA), THE MANHATTAN AND BRONX SURFACE TRANSIT OPERATING AUTHORITY (MABSTOA), THE STATEN ISLAND RAPID TRANSIT.

C. BUSINESS AUTOMOBILE LIABILITY INSURANCE POLICY – (I.S.O. FORM CA 00 01 10 01 OR EQUIVALENT) APPROVED BY THE PERMITTOR IS REQUIRED IF PERMITTEE'S VEHICLE ENTERS PERMITTOR PROPERTY. THE INSURANCE MUST BE IN THE NAME OF THE PERMITTEE OR ITS CONTRACTOR ENTERING THE PERMITTOR PROPERTY WITH LIMITS OF LIABILITY IN THE AMOUNT OF $2,000,000 EACH ACCIDENT FOR CLAIMS FOR BODILY INJURIES (INCLUDING DEATH) TO PERSONS AND FOR DAMAGE TO PROPERTY ARISING OUT OF THE OWNERSHIP, MAINTENANCE OR USE OF ANY OWNED, HIRED OR NON-OWNED MOTOR VEHICLE.

D. RAILROAD PROTECTIVE LIABILITY INSURANCE (ISO-RIMA OR EQUIVALENT FORM) APPROVED BY PERMITTOR COVERING THE WORK TO BE PERFORMED AT THE DESIGNATED JOB SITE AND AFFORDING PROTECTION FOR DAMAGES ARISING OUT OF BODILY INJURY OR DEATH, PHYSICAL DAMAGE TO OR DESTRUCTION OF PROPERLY, INCLUDING DAMAGE TO THE INSURED□S OWN PROPERTY AND CONFORMING TO THE FOLLOWING:

- THE FOLLOWING ARE THE "NAMED INSURED□ FOR THIS COVERAGE:

NEW YORK CITY TRANSIT AUTHORITY (NYCTA); THE MANHATTAN AND BRONX SURFACE TRANSIT OPERATING AUTHORITY (MABSTOA), THE STATEN ISLAND RAPID TRANSIT OPERATING AUTHORITY. (SIRTOA), MTA CAPITAL CONSTRUCTION CO., THE METROPOLITAN TRANSPORTATION AUTHORITY (MTA) INCLUDING ITS SUBSIDIARIES AND AFFILIATES, AND THE CITY OF NEW YORK (AS OWNER). THE LIMIT OF LIABILITY SHALL BE $2,000,000 AT LEAST EACH OCCURRENCE, SUBJECT TO A $6,000,000 ANNUAL AGGREGATE;

- POLICY ENDORSEMENT CO 28 31 – POLLUTION EXCLUSION AMENDMENT IS REQUIRED TO BE ENDORSED ONTO THE POLICY WHEN ENVIRONMENTAL-RELATED WORK AND/OR EXPOSURES EXIST. OPERATING AUTHORITY (SIRTOA), MTA CAPITAL CONSTRUCTION CO., THE METROPOLITAN TRANSPORTATION AUTHORITY (MTA) INCLUDING ITS SUBSIDIARIES AND AFFILIATES, AND THE CITY OF NEW YORK (AS OWNER).
- INDICATE THE NAME AND ADDRESS OF THE CONTRACTOR TO PERFORM THE WORK, THE CONTRACT # AND THE NAME OF THE RAILROAD PROPERTY WHERE THE WORK IS BEING PERFORMED AND THE AGENCY PERMIT.
- EVIDENCE OF RAILROAD PROTECTIVE LIABILITY INSURANCE, MUST BE PROVIDED IN THE FORM OF THE ORIGINAL POLICY. A DETAILED INSURANCE BINDER (ACORD OR MANUSCRIPT FORM) WILL BE ACCEPTED PENDING ISSUANCE OF THE ORIGINAL POLICY, WHICH MUST BE PROVIDED WITHIN 30 DAYS OF THE BINDER APPROVAL.

E. ENVIRONMENTAL/POLLUTION EXPOSURES IN THE EVENT ENVIRONMENTAL OR POLLUTION EXPOSURES EXIST; THE PERMITTEE SHALL REQUIRE THE ENVIRONMENTAL CONTRACTOR OR SUB-CONTRACTOR TO PROVIDE THE APPLICABLE INSURANCE COVERING SUCH EXPOSURE. THE LIMITS AND TYPE OF INSURANCE PROVIDED SHALL BE SATISFACTORY TO THE PERMITTOR AND WILL BE CONFIRMED TO THE PARTIES PRIOR TO THE START OF THE WORK.

2. GENERAL REQUIREMENTS APPLICABLE TO INSURANCE POLICIES

A. ALL OF THE INSURANCE REQUIRED BY THIS ARTICLE SHALL BE WITH COMPANIES LICENSED OR AUTHORIZED TO DO BUSINESS IN THE STATE OF NEW YORK WITH AN A.M. BEST COMPANY RATING OF NOT LESS THAN A-/VII OR BETTER AND REASONABLY APPROVED BY THE PERMITTOR/MTA AND SHALL DELIVER EVIDENCE OF SUCH POLICIES.

B. EXCEPT FOR WORKERS COMPENSATION, ALL REFERENCES TO FORMS AND COVERAGES REFERRED TO ABOVE SHALL BE THE MOST RECENT USED BY THE INSURANCE SERVICES OFFICE INC, ("ISO") OR EQUIVALENT FORMS APPROVED BY THE INSURANCE DEPARTMENT OF THE STATE OR NEW YORK, PROVIDED, HOWEVER, THAT EXCESS COVERAGES MAY BE WRITTEN ON FORMS REASONABLY ACCEPTABLE TO PERMITTOR CONTAINING PROVISIONS OTHER THAN THOSE CONTAINED IN ISO FORMS BUT OTHERWISE CONFORMING IN SUBSTANCE TO THE REQUIREMENTS OF THIS ARTICLE.

C. THE PERMITTEE OR ITS CONTRACTOR PERFORMING THE WORK SHALL FURNISH EVIDENCE OF ALL POLICIES BEFORE ANY WORK IS STARTED TO THE PERMITTOR.

FOR NYCT CONTRACT INSPECTION

C/O MR. JOHN MALVASIO
DIRECTOR, MOW ENGINEERING
130 LIVINGSTON STREET, ROOM 8044F BROOKLYN, NY 11201
TELEPHONE: (718) 694□1358

THESE POLICIES MUST; (I) BE WRITTEN IN ACCORDANCE WITH THE REQUIREMENTS OF THE PARAGRAPHS ABOVE, AS APPLICABLE; (II) BE ENDORSED IN FORM ACCEPTABLE TO INCLUDE A PROVISION THAT THE POLICY WILL NOT BE CANCELLED, MATERIALLY CHANGED, OR NOT RENEWED, UNLESS OTHERWISE INDICATED HEREIN, AT LEAST THIRTY (30) DAYS PRIOR WRITTEN NOTICE TO THE PERMITTOR C/O MTA RISK AND INSURANCE MANAGEMENT DEPARTMENT □ STANDARDS, ENFORCEMENT & CLAIMS UNIT, 2 BROADWAY –21ST FLOOR, NEW YORK, NY 10004; AND (III) STATE OR BE ENDORSED TO PROVIDE THAT THE COVERAGE AFFORDED UNDER THE CONTRACTOR'S POLICIES SHALL APPLY ON A PRIMARY AND NOT ON AN EXCESS OR CONTRIBUTING BASIS WITH ANY POLICIES WHICH MAY BE AVAILABLE TO THE PERMITTOR/MTA, AND ALSO THAT THE CONTRACTOR'S POLICIES, PRIMARY AND EXCESS, MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE. (IV) IN ADDITION, CONTRACTOR'S POLICIES SHALL STATE OR BE ENDORSED TO PROVIDE THAT, IF A SUBCONTRACTOR'S POLICY CONTAINS ANY PROVISION THAT MAY ADVERSELY AFFECT WHETHER CONTRACTOR'S POLICIES ARE PRIMARY AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE, CONTRACTOR'S AND SUBCONTRACTOR'S POLICIES SHALL NEVERTHELESS BE PRIMARY AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE. EXCEPT FOR PROFESSIONAL LIABILITY, POLICIES WRITTEN ON CLAIMS MADE BASIS ARE NOT ACCEPTABLE. AT LEAST TWO (2) WEEKS PRIOR TO THE EXPIRATION OF THE POLICIES, CONTRACTOR SHALL ENDEAVOR TO PROVIDE EVIDENCE OF RENEWAL OR REPLACEMENT POLICIES OF INSURANCE, WITH TERMS AND LIMITS NO LESS FAVORABLE THAN THE EXPIRING POLICIES. EXCEPT AS OTHERWISE INDICATED IN THE DETAILED COVERAGE PARAGRAPHS BELOW, SELF INSURED RETENTIONS AND POLICY DEDUCTIBLES SHALL NOT EXCEED $100,000, UNLESS SUCH INCREASED DEDUCTIBLE OR RETENTION IS APPROVED BY PERMITTOR/MTA. THE PERMITTEE SHALL BE RESPONSIBLE FOR ALL CLAIM EXPENSE AND LOSS PAYMENTS WITHIN THE DEDUCTIBLE OR SELF-INSURED RETENTION. THE INSURANCE MONETARY LIMITS REQUIRED HEREIN MAY BE MET THROUGH THE COMBINED USE OF THE INSURED'S PRIMARY AND UMBRELLA/EXCESS POLICIES.

D. CERTIFICATES OF INSURANCE MAY BE SUPPLIED AS EVIDENCE OF POLICIES OF THE ABOVE POLICIES, EXCEPT THE RAILROAD PROTECTIVE LIABILITY POLICY, DESIGNATED AS POLICY D. HOWEVER, IF REQUESTED BY THE PERMITTOR, THE PERMITTEE SHALL DELIVER TO THE AUTHORITY, WITHIN FORTY-FIVE (45) DAYS OF THE REQUEST, A COPY OF SUCH POLICIES, CERTIFIED BY THE INSURANCE CARRIER AS BEING TRUE AND COMPLETE. THE RAILROAD PROTECTIVE LIABILITY INSURANCE POLICY MUST BE PROVIDED IN THE FORM OF THE ORIGINAL POLICY. A DETAILED INSURANCE BINDER MAY BE PROVIDED, ACORD OR MANUSCRIPT FORM, PENDING ISSUANCE OF THE ORIGINAL POLICY. THE ORIGINAL POLICY MUST BE SUBMITTED TO MTA RIM WITHIN 30 DAYS OF THE BINDER APPROVAL.

E. IF A CERTIFICATE OF INSURANCE IS SUBMITTED, IT MUST: (1) BE PROVIDED ON THE PERMITTOR CERTIFICATE OF INSURANCE FORM OR MTA CERTIFICATE OF INSURANCE FORM FOR .JOINT AGENCY AGREEMENTS; (2) BE SIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE INSURANCE CARRIER OR PRODUCER AND NOTARIZED; (3) DISCLOSE ANY DEDUCTIBLE, SELF-INSURED RETENTION, SUB-LIMIT, AGGREGATE LIMIT OR ANY EXCLUSIONS TO THE POLICY THAT MATERIALLY CHANGE THE COVERAGE; (4) INDICATE THE ADDITIONAL INSUREDS AND NAMED INSUREDS AS REQUIRED HEREIN, ALONG WITH A PHYSICAL COPY OF THE ADDITIONAL INSURED ENDORSEMENT (I.S.O. FORM 'CG 20 26 07/04 VERSION OR EQUIVALENT), AS APPLICABLE AND THE ENDORSEMENT(S) MUST INCLUDE POLICY NUMBER(S); (5) REFERENCE THE CONTRACT BY NUMBER ON THE FACE OF THE CERTIFICATE; AND (6) EXPRESSLY REFERENCE THE INCLUSION OF ALL REQUIRED ENDORSEMENTS.

F. THE MINIMUM AMOUNTS OF INSURANCE REQUIRED IN THE DETAIL DESCRIPTION OF POLICIES A, B, C, AND D ABOVE SHALL NOT BE CONSTRUED TO LIMIT THE EXTENT OF THE PERMITTEE'S LIABILITY UNDER THIS AGREEMENT.

G. IF, AT ANY TIME DURING THE PERIOD OF THIS AGREEMENT, INSURANCE AS REQUIRED IS NOT IN EFFECT, OR PROOF THEREOF IS NOT PROVIDED TO THE PERMITTOR, THE PERMITTOR SHALL HAVE THE OPTIONS TO: (I) DIRECT THE PERMITTEE TO SUSPEND WORK OR OPERATION WITH NO ADDITIONAL COST OR EXTENSION OF TIME DUE ON ACCOUNT THEREOF; OR (II) TREAT SUCH FAILURE AS AN EVENT OF DEFAULT.

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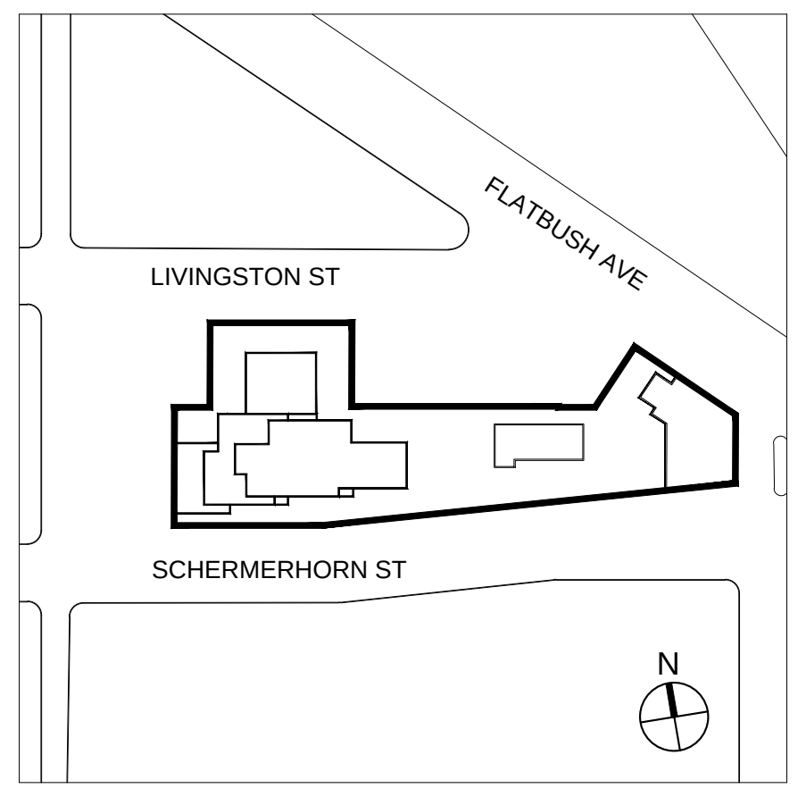
Revisions



Key Plan

NYC TRANSIT NOTES AND INSURANCE CLAUSES

Date Feb. 26, 2014
Scale AS NOTED
Drawn By JML
Checked By DE
Project No. 5685
Seal
Sheet No.
1 of 4
1.00
NOTES.dwg

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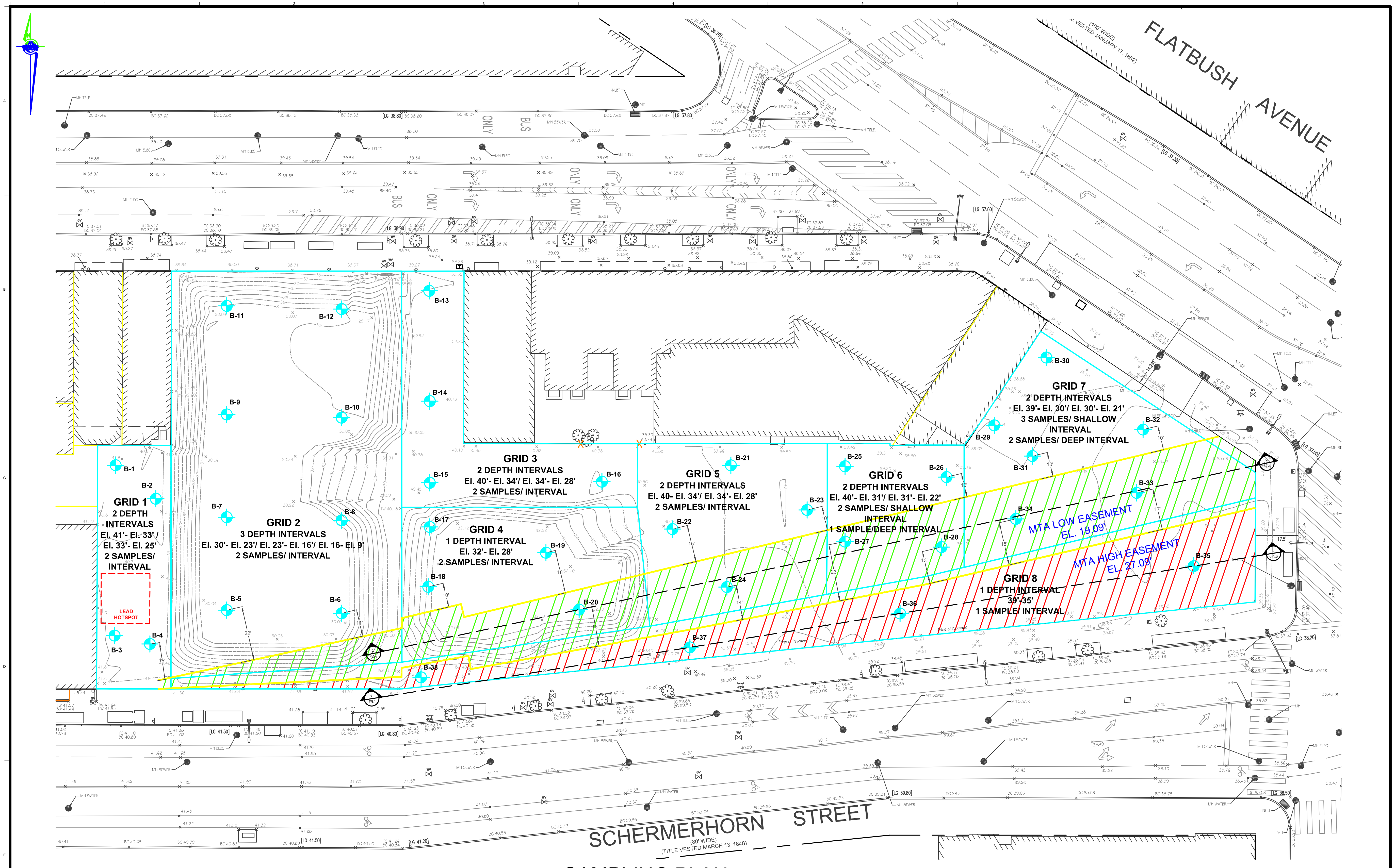

BASE MAP PROVIDED BY:
NEW YORK CITY LAND SURVEYORS, PC
200 RADCLIFF ROAD, STATEN ISLAND, NY 10305
PHONE: 1-718-816-8182

SAMPLING PLAN

SCALE: 1"=40'

0 40 80

SCALE: 1" = 40'

LEGEND

B-36 SOIL BORING

—41— SURFACE CONTOUR INTERVAL

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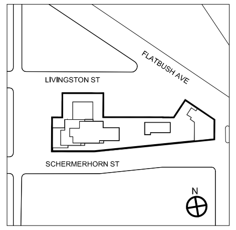
Revisions



Key Plan

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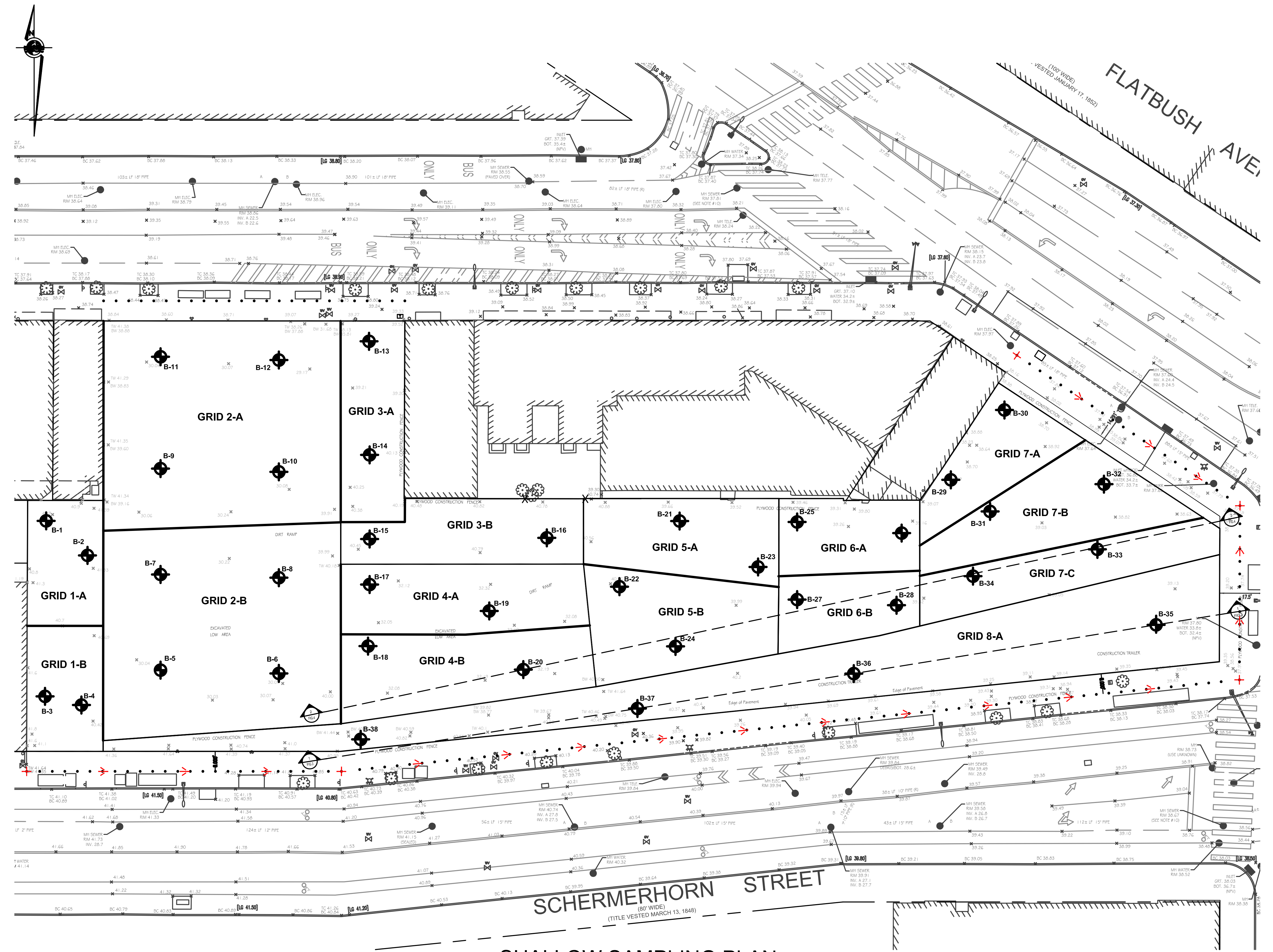
SAMPLING PLAN

Date Jan. 30, 2014
Scale AS NOTED
Drawn By JML
Checked By DE
Project No. 5685 Seal
Sheet No. 2 of 4 **2.00**

NYCLS STEINER HUB TOPO - EXCAVATION GRID - 1-30-14.dwg



SHALLOW SAMPLING PLAN

SCALE: 1"=20'

0 20 40

SCALE: 1" = 20'

BASE MAP PROVIDED BY:
NEW YORK CITY LAND SURVEYORS, PC
200 RADCLIFF ROAD, STATEN ISLAND, NY 10305
PHONE: 1-718-816-8182

LEGEND

⊕ B-36	SOIL BORING
—41—	SURFACE CONTOUR INTERVAL

STEINER

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c/o Steiner NYC, LLC
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Brooklyn Navy Yard
Brooklyn, New York 11205

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Structural Engineers
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Mechanical/Electrical/Plumbing Engineers
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Geotechnical Engineers
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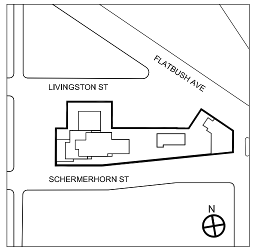
East Windsor, NJ 08512

Environmental Consultant
P.W. Grosser Consulting
630 Johnson Avenue, Suite 7
Bohemia, NY 11716

333 Schermerhorn
Brooklyn, New York 11217

Revisions

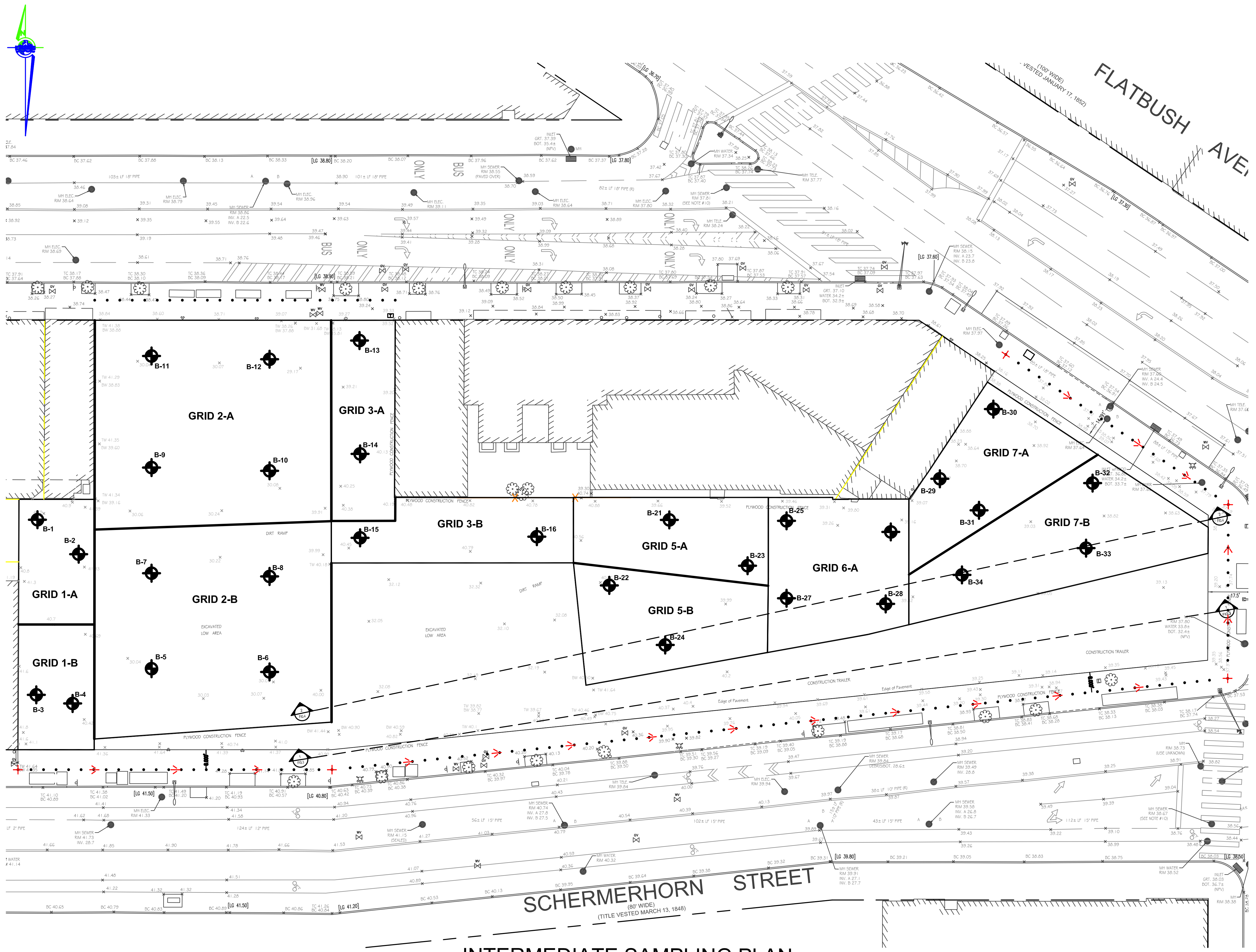


Key Plan

SHALLOW SAMPLING PLAN

Date Feb. 18, 2014
Scale AS NOTED
Drawn By JML
Checked By DE
Project No. 5685 Seal
Sheet No. 2A.00
- of -

NYCLS STEINER HUB TOPO - 2-14-14.dwg



INTERMEDIATE SAMPLING PLAN

SCALE: 1"=20'

0 20 40

SCALE: 1" = 20'

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LEGEND

B-36 ⊕ SOIL BORING

—— 41 —— SURFACE CONTOUR INTERVAL

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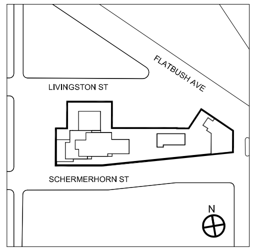


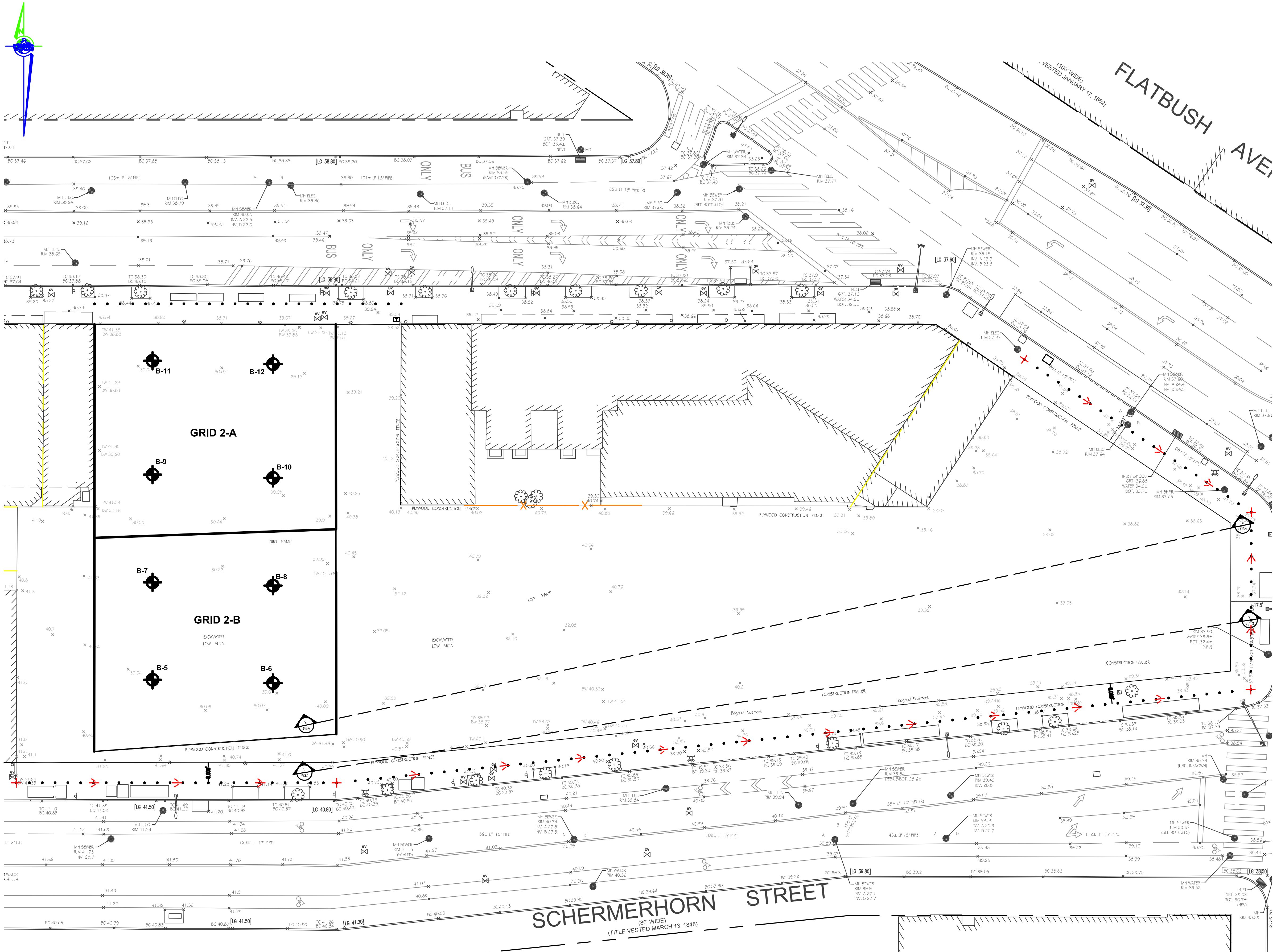
Key Plan

INTERMEDIATE SAMPLING PLAN

Date Feb. 18, 2014
Scale AS NOTED
Drawn By JML
Checked By DE
Project No. 5685 Seal
Sheet No. - of -

2B.00

NYCLS STEINER HUB TOPO - 2-14-14.dwg



DEEP SAMPLING PLAN

SCALE: 1"=20'

0 20 40

SCALE: 1" = 20'

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NEW YORK CITY LAND SURVEYORS, PC
200 RADCLIFF ROAD, STATEN ISLAND, NY 10305
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LEGEND

⊕ B-36 SOIL BORING

—41— SURFACE CONTOUR INTERVAL

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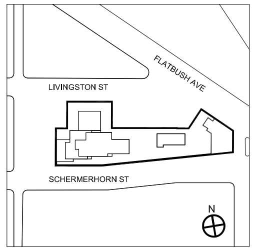

Key Plan

DEEP SAMPLING PLAN

Date Feb. 18, 2014
Scale AS NOTED
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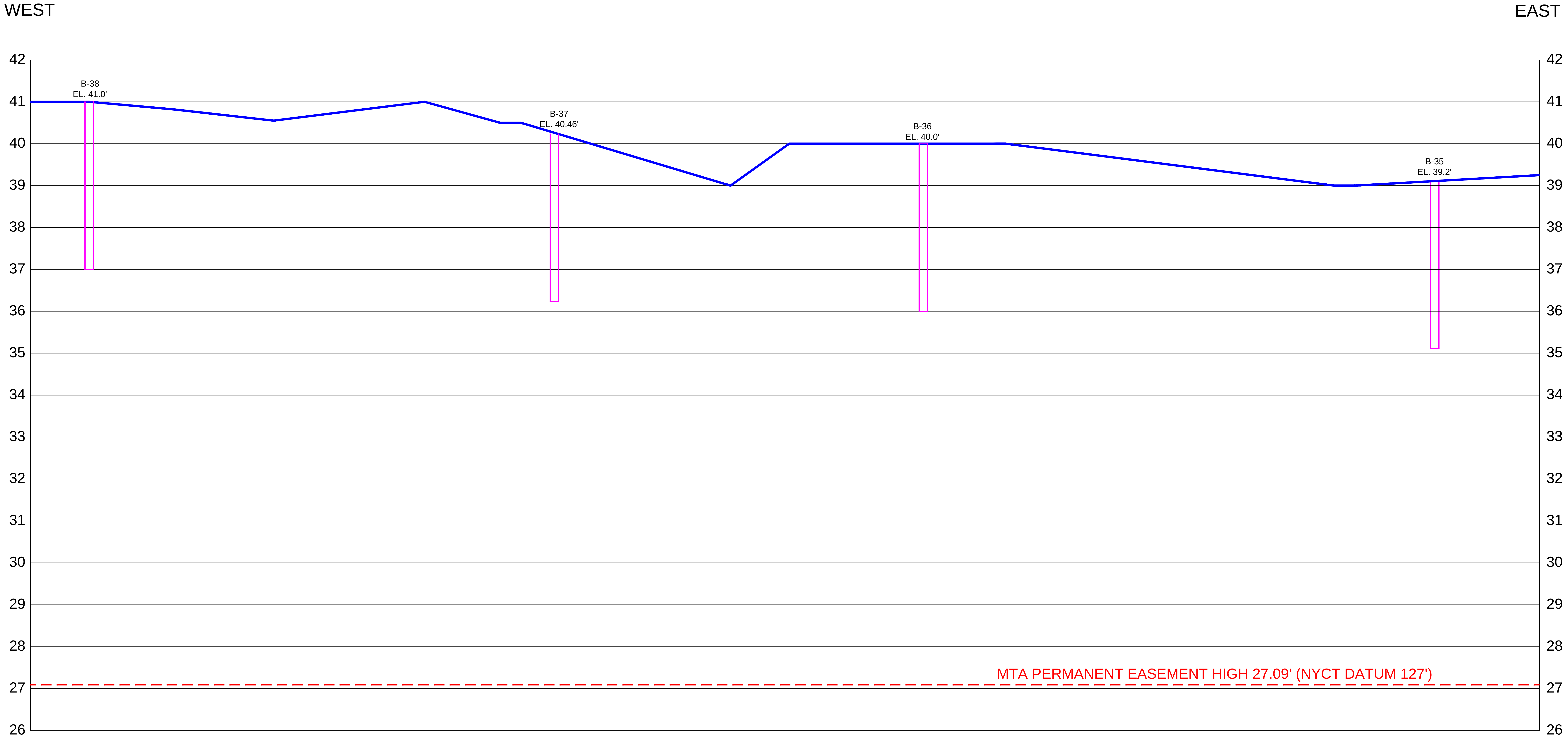
Project No. 5685 Seal
Sheet No. 2C.00
- of -

NYCLS STEINER HUB TOPO - 2-14-14.dwg



CROSS SECTION 1

SCALE: V: 1"=1' H:1"=10'

1
FIG.2

0 10 20
SCALE: 1" = 10'

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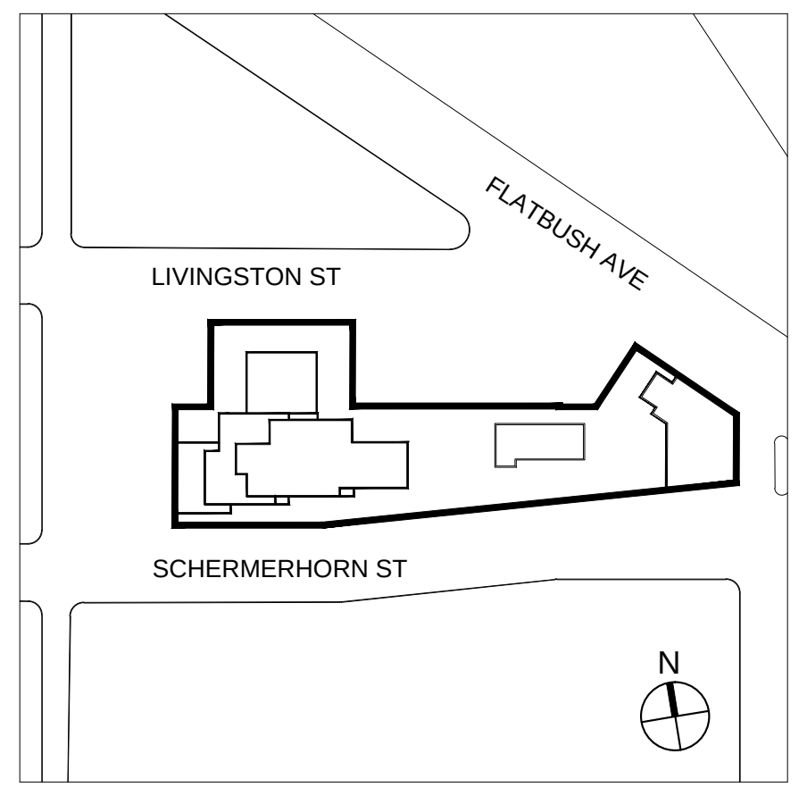
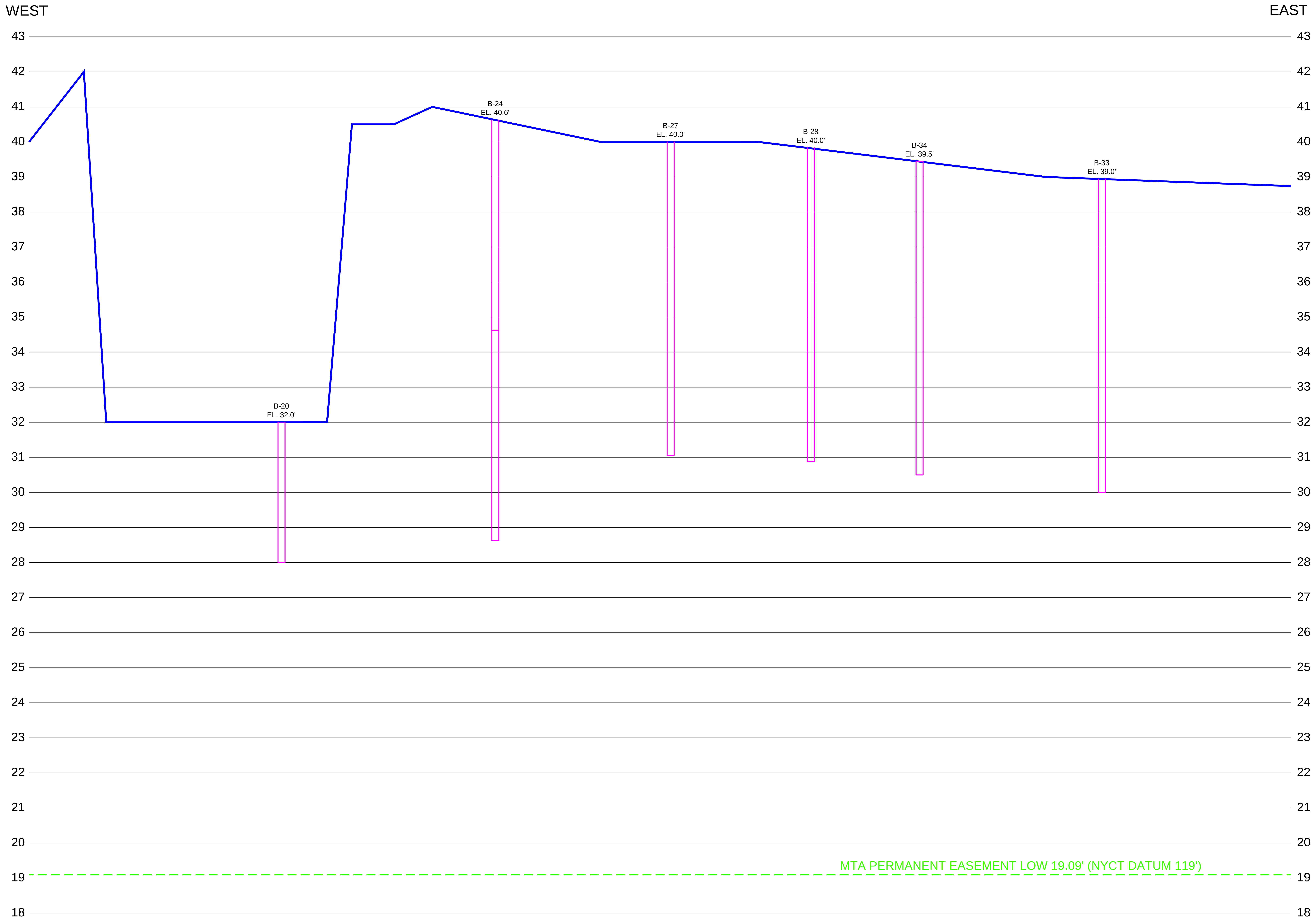


Key Plan

SAMPLING PLAN CROSS SECTION 1

Date Feb. 26, 2014
Scale AS NOTED
Drawn By JML
Checked By DE
Project No. 5685 Seal
Sheet No.
3 of 4
3.00

NYCLS STEINER HUB TOPO - 2-26-14.dwg



CROSS SECTION 2

SCALE: V: 1"=1' H:1"=10'

2
FIG.2

0 10 20
SCALE: 1" = 10'

STEINER

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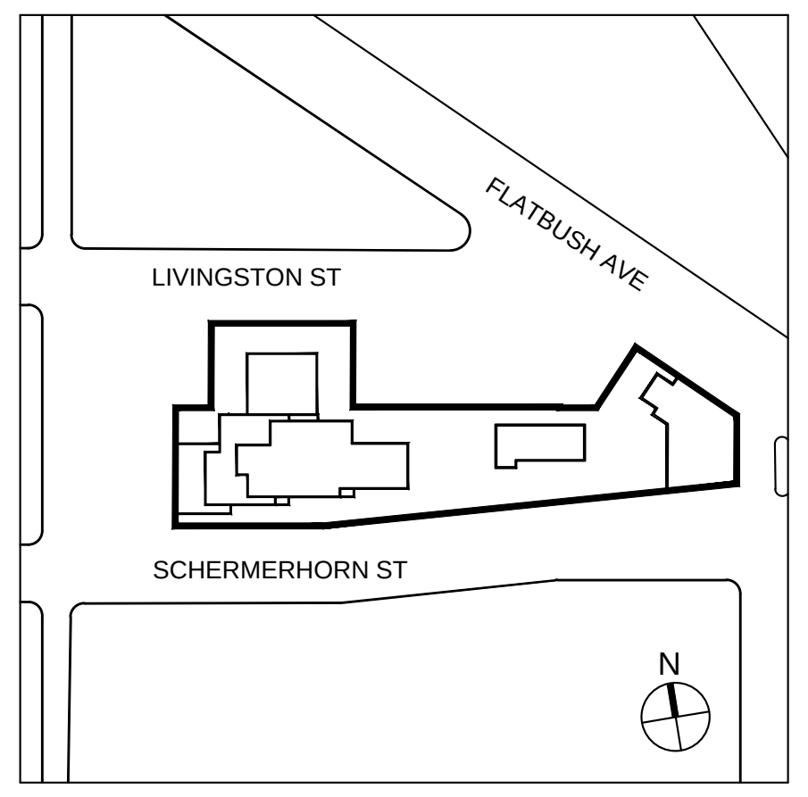

Key Plan

SAMPLING PLAN
CROSS SECTION 2

Date Feb. 26, 2014
Scale AS NOTED
Drawn By JML
Checked By DE
Project No. 5685
Seal
Sheet No.
4 of 4
4.00

NYCLS STEINER HUB TOPO - 2-26-14.dwg

APPENDIX A

Sampling Requirements - Beneficial Use Sites

		PARAMETERS	**TPHC (QAM Method and Extractable Petroleum Hydrocarbon/EPH)**	**TOTAL VOLATILE ORGANICS (TCL+10 & NJDEP SCC List + NJDEP SRS List)**	**TOTAL SEMIVOLATILE ORGANICS (TCL + 20 & NJDEP SCC List + NJDEP SRS List)**	**Total Cyanide**	**TAL Metals & Hexavalent Chromium and Mercury**	**TCLP METALS (8 RCRA)**	**PCBs**	**Total Pesticides (TCL + NJDEP SCC List & NJDEP SRS List)**	**Geotechnical Sample (1)**
METHODS**	**Type of material**		OQA-QAM-025 and Extractable Petroleum Hydrocarbon/EPH	8260B - **with EnCore sampling devices**	8270D	9014	6000/7000	1311/6010	8082A	8081A/8151A	
		FREQUENCY									
Cross Approval - Prospect Park, Teterboro and ILR	**Construction Fill (Most Soil Jobs)**	Grab - Every 2,500 cy **- With EnCore**		**X**							
		5 point grab composite every 2,500 cy	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**

(1) The address for the geotechnical samples are below. We need to be notified 24 hours in advance of any sample delivery or drop off. A transmittal sheet including the project name and any contact information needs to accompany each sample and the samples should be delivered in two (2) 5- gallon buckets.

**** The methods provided are standard EPA methods. The method revisions are subject to change and the most current method should always be utilized by the laboratory.**

Protocol for sampling requires one (1) grab for every 500 cy and screening of each of the five (5) grab samples with a PID. The highest PID grab sample for every 2,500 cy is to be submitted for the VOC portion of the testing utilizing an ENCORE sampling device. The five (5) grab samples are then to be composited for every 2,500 cy and submitted for the remaining parameters.

Teterboro –
Robert E. Schwankert, PE
Melick-Tully and Associates, P.C.
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South Bound Brook, NJ 08880
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ILR/Prospect Park–
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Principal
SESI CONSULTING ENGINEERS
12-A Maple Avenue
Pine Brook, NJ 07058

Phone: (973) 808-9050
Fax: (973) 808-9099
email: msp@sesi.org

9/28/2012

Clean Earth Sampling Protocol
Carteret

PARAMETERS		TPH	TOTAL VOLATILE ORGANICS	PAHs	TOTAL METALS RCRA	TCLP METALS RCRA	IGNITABILITY	CORROSIVITY (PH)	REACTIVITY - SULFIDE AND CYANIDE	PCBs
METHODS (1)		8015M	8260B	8270	6010	1311/6010	1010A	9040C	SW846 CHAPTER 7.3	8082A
	FREQUENCY									
RESIDENTIAL	5 point grab composite every 100 cy (1 grab/20 cy)	**X**								
	8 point grab composite every 800 cy (1 grab/100 cy)		**X**							
Limit		<15,000				Below RCRA Toxicity Level	Negative	>2 - <12.5	Sulfide <500 Cyanide <250	<2
COMMERCIAL	5 point grab composite every 100 cy (1 grab/20 cy)	**X**								
	8 point grab composite every 800 cy (1 grab/100 cy)		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Limit		<15,000			End Use Criteria	Below RCRA Toxicity Level	Negative	>2 - <12.5	Sulfide <500 Cyanide <250	<2

(1) The methods provided are standard EPA methods. The method revisions are subject to change and the most current method should always be utilized by the laboratory.

This is to be used as a guideline for sampling. Sampling frequencies and parameter requirements may be modified at the discretion of the CE Approval staff based items such as site history, levels of contamination and/or source of contamination, etc.

5/23/2012

Sampling Requirements - CEC + Beneficial Use Sites

		PARAMETERS	EPH (Extractable Petroleum Hydrocarbon)	TOTAL VOLATILE ORGANICS (TCL +10 & NJDEP SCC List + NJDEP SRS List)	TOTAL SEMIVOLATILE ORGANICS (TCL + 20 & NJDEP SCC List + NJDEP SRS List)	Total Cyanide	TAL Metals & Hexavalent Chromium and Mercury	TCLP METALS (8 RCRA)	PCBs	Total Pesticides (TCL + NJDEP SCC List & NJDEP SRS List)	RCRA Characteristics (Ignitability, Corrosivity, Reactivity)	Geotechnical Sample (1)
METHODS**	**Type of material**		Extractable Petroleum Hydrocarbon/EPH	8260B - **with EnCore sampling devices**	8270D	9014	6000/7000	1311/6010	8082A	8081A/8151A		
		FREQUENCY										
<u>Cross Approval</u> - BU Sites (ILR, P PARK and DuPont) & CEC	**Construction Fill (Most Soil Jobs)**	Grab - Every 800 cy **- With EnCore**		**X**								
		5 point grab composite every 800 cy	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

(1) The address for the geotechnical samples are below. We need to be notified 24 hours in advance of any sample delivery or drop off. A transmittal sheet including the project name and any contact information needs to accompany each sample and the samples should be delivered in two (2) 5- gallon buckets.

**** The methods provided are standard EPA methods. The method revisions are subject to change and the most current method should always be utilized by the laboratory.**

Protocol for sampling requires the screening of each of the five (5) grab samples with a PID. The highest PID grab sample for every 800 cy is to be submitted for the VOC portion of the testing utilizing an ENCORE sampling device. The five (5) grab samples are then to be composited for every 800 cy and submitted for the remaining parameters.

<u>ILR/Prospect Park–</u>
Michael St. Pierre, PE
Principal
SESI CONSULTING ENGINEERS
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4/10/2013

APPENDIX B

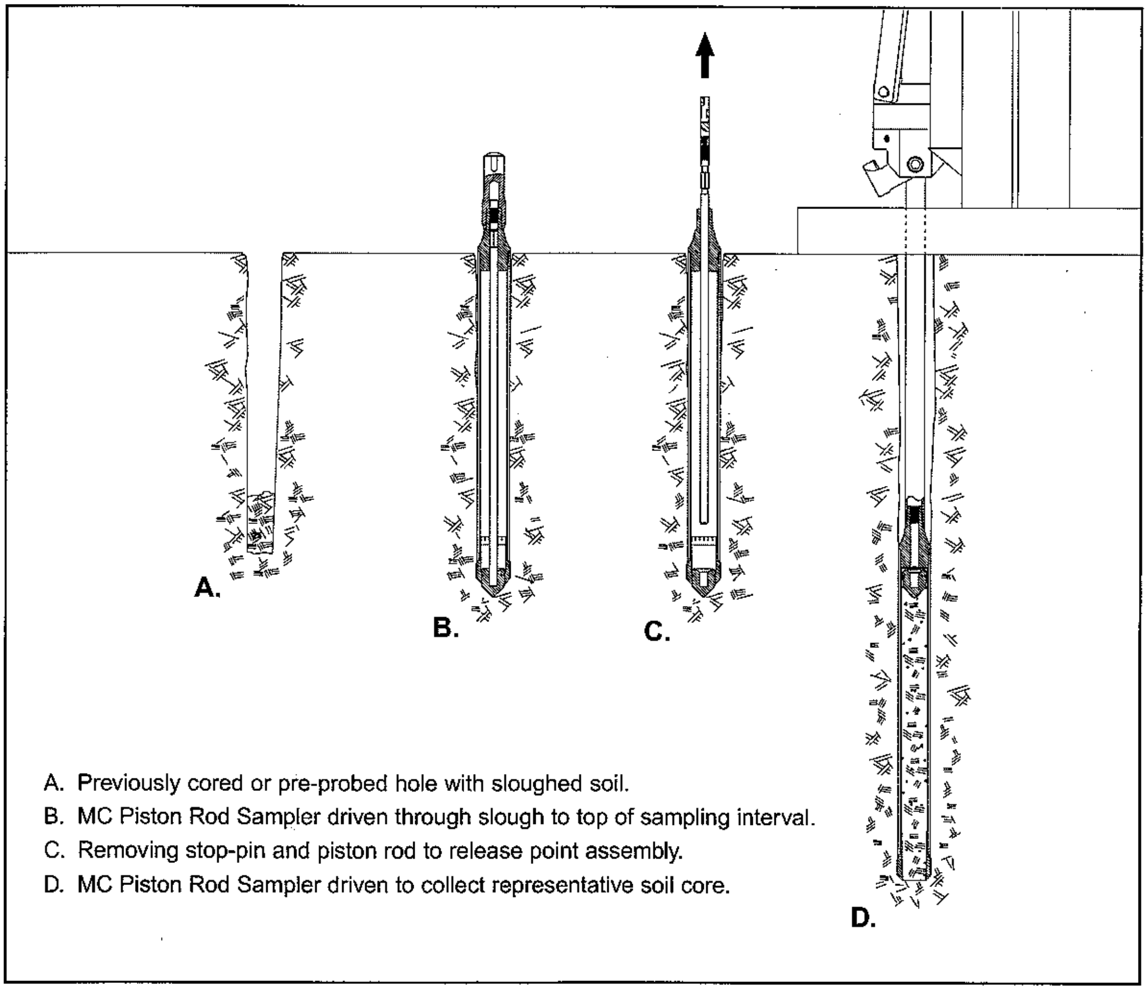
GEOPROBE MACRO-CORE® SOIL SAMPLER

STANDARD OPERATING PROCEDURE

Technical Bulletin No. 95-8500

PREPARED: November, 1995

REVISED: September, 1998



A. Previously cored or pre-probed hole with sloughed soil.
B. MC Piston Rod Sampler driven through slough to top of sampling interval.
C. Removing stop-pin and piston rod to release point assembly.
D. MC Piston Rod Sampler driven to collect representative soil core.

OPERATION OF MACRO-CORE® PISTON ROD SOIL SAMPLING SYSTEM

Geoprobe® Systems

A DIVISION OF KEJR, INC.

**Geoprobe® is a Registered Trademark of
Kejr, Inc., Salina, Kansas**

**Macro-Core® is a Registered Trademark of
Kejr, Inc., Salina, Kansas**

**Macro-Core® and Large Bore Soil Samplers
manufactured under US Patent 5,606,139.**

**Macro-Core® Closed-Piston Drive Point
manufactured under US Patent 5,542,481**

1.0 OBJECTIVE

The objective of this procedure is to collect a representative soil sample at depth and recover it for visual inspection and/or chemical analysis.

2.0 BACKGROUND

2.1 Definitions

Geoprobe®*: A brand name of high quality, hydraulically-powered machines that utilize both static force and percussion to advance sampling and logging tools into the subsurface.
** Geoprobe® is a registered trademark of Kejr, Inc., Salina, Kansas*

Macro-Core® Soil Sampler*: A solid barrel, direct push device for collecting continuous core samples of unconsolidated materials at depth. Although other lengths are available, the standard Macro-Core® Sampler has an assembled length of approximately 52 inches (1321 mm) with an outside diameter (OD) of 2.2 inches (56 mm). Collected samples measure up to 1300 ml in volume in the form of a 1.5-inch x 45-inch (38 mm x 1143 mm) core contained inside a removable liner. The Macro-Core® Sampler may be used in an open-tube or closed-point configuration.
** Macro-Core® is a registered trademark of Kejr, Inc., Salina, Kansas*

Liner: A removable/replaceable, thin-walled tube inserted inside the Macro-Core® sample tube for the purpose of containing and storing soil samples. While other lengths are available, the standard Macro-Core® Liner is 1.75 inches OD x 46 inches long (44 mm x 1168 mm). Liner materials include stainless steel, Teflon®, PVC, and PETG.

2.2 Discussion

In this procedure, an assembled Macro-Core® Soil Sampler is driven one sampling interval into the subsurface and then retrieved using a Geoprobe soil probing machine. The collected soil core is removed from the sampler along with the used liner. After decon, the Macro-Core® sampler is reassembled using a new liner. The clean sampler is then advanced back down the same hole to collect the next soil core. The Macro-Core® Sampler may be used as an open-tube or closed-point sampler.

The Macro-Core® Soil Sampler is most commonly used as an open-tube sampler (Fig. 2.1A). In this configuration, coring starts at the ground surface with a sampler that is open at the leading end. The sampler is driven into the subsurface and then pulled from the ground to retrieve the first soil core. In stable soils, an open-tube sampler is advanced back down the same hole to collect the next core.

In unstable soils which tend to collapse into the core hole, the Macro-Core® Sampler can be equipped with a piston rod point assembly (Fig. 2.1B). The point fits firmly into the cutting shoe and is held in place by a piston rod and stop-pin. The MC Piston Rod System prevents collapsed soil from entering the sampler as it is advanced to the bottom of an existing hole, thus ensuring collection of a reprentative sample.

The Macro-Core® Piston Rod Sampler is not designed to be driven through undisturbed soil. A probe hole must be opened above the sampling interval either by removing continuous soil cores with an open-tube sampler, or by advancing a Macro-Core® Pre-Probe to depth.

Once a hole is opened to the appropriate depth, an assembled MC Piston Rod Sampler is advanced through any slough material to the top of the next sampling interval. Extension rods are inserted through the probe rod string and threaded onto the MC Stop-Pin Assembly. When unthreaded, the stop-pin is removed from the tool string with the extension rods. (MC Piston rod is removed with stop-pin if MC Stop-Pin Coupler is utilized). With the point assembly now released, the tool string is driven into the subsurface to fill the sampler with soil. The point assembly is later retrieved from the sampler with the liner and soil core.

Loose soils may fall from the bottom of the sampler as it is retrieved from depth. The MC Core Catcher (Fig. 3.1) alleviates this problem. Excellent results are obtained when the core catcher is used with saturated sands and other non-cohesive soils. A core catcher should not be used with tight soils as it may actually inhibit sample recovery. Constructed of PVC, the core catcher is suitable for use with all Geoprobe liners.

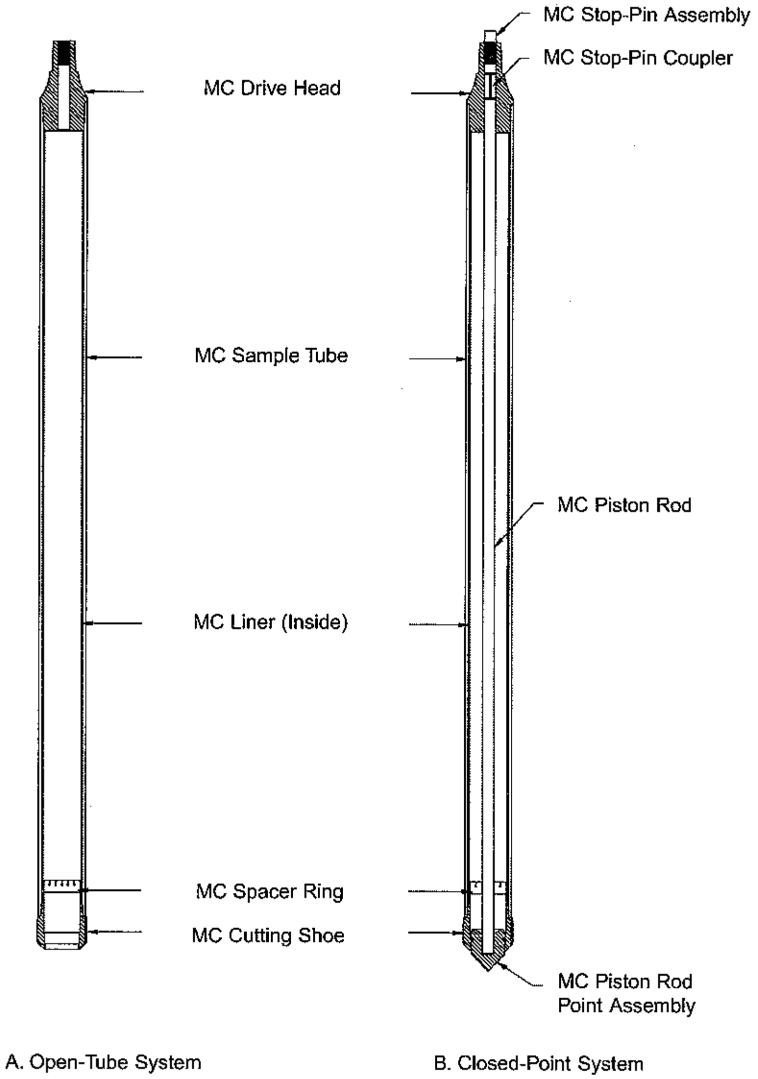


FIGURE 2.1
Macro-Core® Soil Sampler Configurations

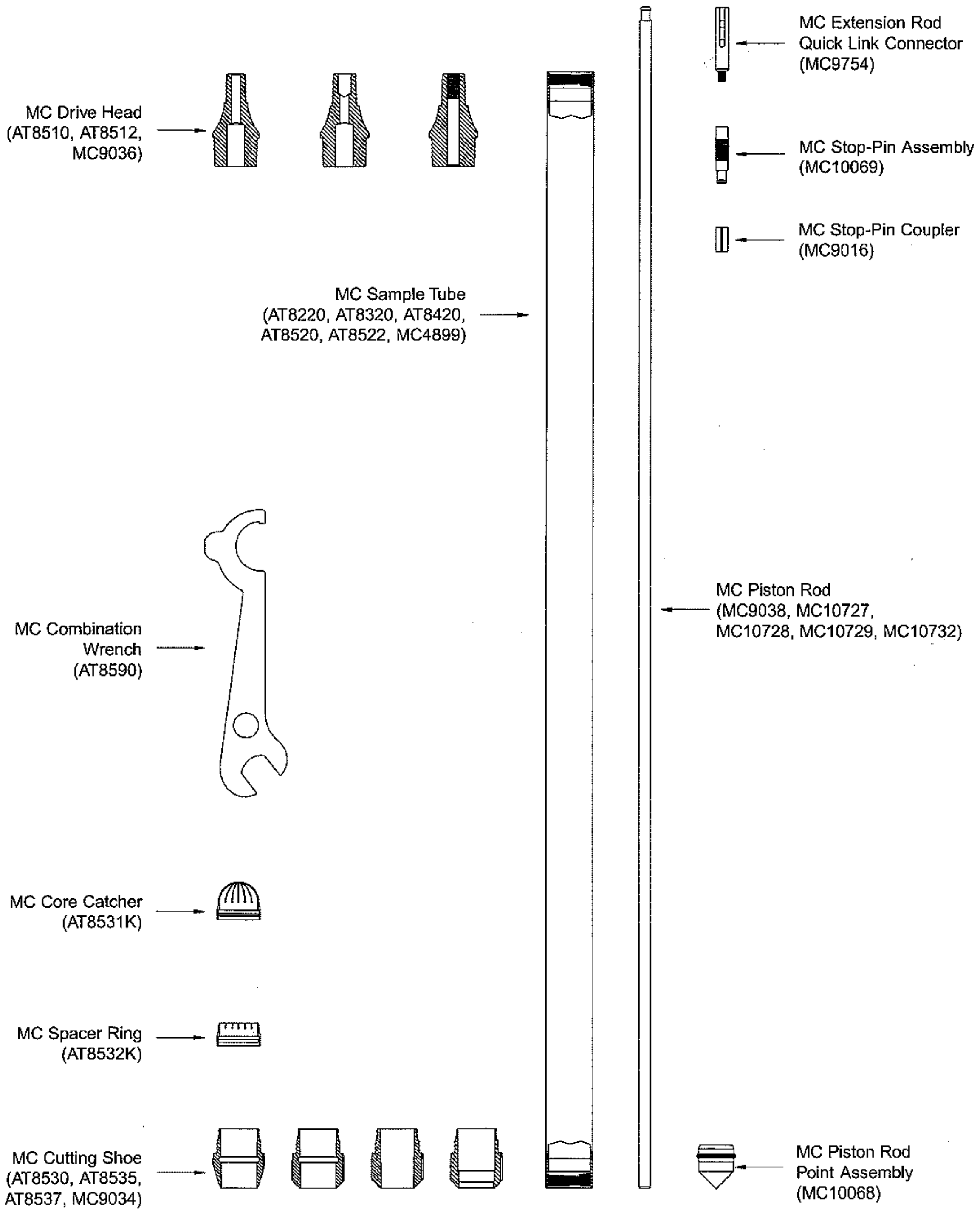


FIGURE 3.1

Macro-Core® Soil Sampler Parts

3.0 REQUIRED EQUIPMENT

The following equipment is used to recover samples using the Geoprobe Macro-Core® Soil Sampler and probing system. Although many options are available (sampler length, liner material, etc.), the basic sampler configuration does not change. Refer to Figure 3.1 (previous page) to view the major components of the Macro-Core® sampler.

MACRO-CORE® SAMPLER PARTS	**PART NUMBER**
MC Drive Head, for use with 1.0-inch probe rods	AT8510
MC Drive Head, for use with 1.25-inch probe rods	AT8512
MC Sample Tube, 24-inch, unplated	AT8220
MC Sample Tube, 36-inch, unplated	AT8320
MC Sample Tube, 1-meter, unplated	AT8420
MC Sample Tube, 48-inch, Ni-plated	AT8520
MC Sample Tube, 48-inch, unplated	AT8522
MC Sampler Tube, 60-inch, unplated	MC4889
MC Cutting Shoe, standard	AT8530
MC Cutting Shoe, heavy-duty	AT8535
MC Cutting Shoe, 0.125 inches undersized	AT8537
MC Combination Wrench	AT8590
Nylon Brush for MC Sample Tubes	BU700

MACRO-CORE® PISTON ROD SYSTEM PARTS	**PART NUMBER**
O-Rings for MC Stop-Pin (pkg. of 25)	AT6312R
O-Rings for MC Piston Rod Point (pkg. of 25)	DT4070R
MC Stop-Pin Coupler (pkg. of 5)	MC9016
MC Cutting Shoe, for use with piston rod point	MC9034
MC Drive Head, for use with 1.25-inch probe rods and stop-pin	MC9036
MC Piston Rod, 48-inch	MC9038
MC Extension Rod Quick Link Connector	MC9754
MC Piston Rod Point Assembly	MC10068
MC Stop-Pin Assembly	MC10069
MC Piston Rod/Stop-Pin Assembly, 48-inch	MC10070
MC Piston Rod, 60-inch	MC10727
MC Piston Rod, 36-inch	MC10728
MC Piston Rod, 24-inch	MC10729
MC Piston Rod, 1-meter	MC10732
MC Piston Rod/Stop-Pin Assembly, 60-inch	MC11881
MC Piston Rod/Stop-Pin Assembly, 36-inch	MC12028
MC Piston Rod/Stop-Pin Assembly, 24-inch	MC12029
MC Piston Rod/Stop-Pin Assembly, 1-meter	MC12030
MC Quick Link Kit	MC12131

MACRO-CORE® LINERS AND ACCESSORIES	**PART NUMBER**
MC Stainless Steel Liner Assembly, 48-inch	AT7235
MC Teflon® Liner Assembly, 48-inch	AT724
MC PETG Liner, thin-wall, 48-inch, (box of 66)	AT725K
MC Vinyl End Caps (66 pair)	AT726K
MC Heavy-Duty PETG Liner Assembly, 48-inch (box of 66)	AT825K
MC PVC Liner Assembly, clear, 24-inch (box of 66)	AT922K
MC PVC Liner Assembly, clear, 36-inch (box of 66)	AT923K
MC PVC Liner Assembly, clear, 1-meter (box of 66)	AT924K
MC PVC Liner Assembly, clear, 48-inch (box of 66)	AT925K
MC Liner Cutter Kit	AT8000K
MC Liner Cutting Tool*	AT8010
MC Liner Cutter Holder*	AT8020
MC Liner Cutter Blades (pkg. of 5)*	AT8030
MC Liner Circular Cutting Tool	AT8050
MC Core Catchers (pkg. of 25)	AT8531K
MC Spacer Rings (pkg. of 25)	AT8532K
MC PVC Liner Assembly, clear, 60-inch (box of 66)	11984

GEOPROBE TOOLS**	**PART NUMBER**
Drive Cap, for use with 1.25-inch probe rods	AT1200
Slotted Drive Cap, for use with 1.25-inch probe rods	AT1202
Pull Cap, for use with 1.25-inch probe rods	AT1204
Probe Rod, 1.25 inches x 36 inches	AT1236
Probe Rod, 1.25 inches x 1 meter	AT1239
Probe Rod, 1.25 inches x 48 inches	AT1248
Probe Rod, 1.25 inches x 60 inches	AT1260
MC Pre-Probe, 2-inch OD	AT1247
MC Pre-Probe, 2.5-inch OD	AT1242
MC Pre-Probe, 3-inch OD	AT1252
Extension Rod, 36-inch	AT67
Extension Rod, 48-inch	AT671
Extension Rod, 1-meter	AT675
Extension Rod Coupler	AT68
Extension Rod Handle	AT69
Extension Rod Quick Links	AT694K
Machine Vise	FA300

ADDITIONAL TOOLS

Combination Wrench, 1/2-inch (or) Adjustable Wrench
Pipe Wrenches (2)

---

*The items are included in the MC Liner Cutter Kit (AT8000K).
**Geoprobe tools and accessories are also available for use with 1.0-inch OD (outside diameter) probe rods.

4.0 OPERATION

Size and material options have resulted in an extensive list of Macro-Core® part numbers. To simplify the instructions presented in this document, part numbers are listed in the illustrations only. Refer to Pages 6 and 7 for a complete parts listing.

4.1 Decontamination

Before and after each use, thoroughly clean all parts of the soil sampling system according to project requirements. A new, clean liner is recommended for each sample if using PETG, PVC, or Teflon® liners.

Stainless Steel Liners from Geoprobe Systems are cleaned at the factory with an agitated detergent bath at a temperature of approximately 180 degrees F. After rinsing with 180-degree tap water, the liner is air dried, wrapped in PVC outer cladding, and capped with vinyl end caps.

Thoroughly clean the sampler before assembly, not only to remove contaminants but also to ensure correct operation. Dirty threads complicate assembly and may lead to sampler failure. Sand is particularly troublesome as it can bind liners in the sample tube resulting in wasted time and lost samples.

4.2 Field Blank

It is suggested that a field blank be taken on a representative sample liner prior to starting a project and at regular intervals during extended projects. Liners can become contaminated in storage. A field blank will prove that the liners do not carry contaminates which can be transferred to soil samples. The following information is offered as an example method which may be used to take a field blank. Make the appropriate modifications for the specific analytes of interest to the investigation.

Example Procedure:

REQUIRED EQUIPMENT

MC Liner	(1)
MC Vinyl End Caps	(2)
Distilled Water	(100 ml)
VOA Vial (or other appropriate sample container)	(1)

1. Place a vinyl end cap on one end of the liner.

2. Pour 100 milliliters of distilled water (or other suitable extracting fluid) into the liner.

3. Place a vinyl end cap on the open end of the liner.

4. From the vertical position, repeatedly invert the liner so that the distilled water contacts the entire inner surface. Repeat this step for one minute.

5. Remove one end cap from the liner, empty contents into an appropriate sample container, and cap the container.

6. Perform analysis on the extract water for the analytes of interest to the investigation.

4.3 Open-Tube Sampler Assembly

1a. **(With MC Core Catcher)** Place the open end of an MC Core Catcher over the threaded end of an MC Cutting Shoe as shown in Figure 4.1. Apply pressure to the core catcher until it snaps into the machined groove on the cutting shoe.

NOTE: AT725K (thin-wall PETG) liners have a swedged end which is generally slipped directly over the groove in the cutting shoe (Fig. 4.2). To use a core catcher with these liners, cut approximately 0.25 inches (6 mm) of material from the swedged end of the liner and proceed to Step 2.

1b. **(Without MC Core Catcher)** Push the base of an MC Spacer Ring onto the threaded end of a cutting shoe until it snaps into place (Fig. 4.3).

NOTE: With the exception of AT-725K (thin-wall PETG) liners, all liners must utilize either a spacer ring or core catcher. PETG liners have a swedged end which slides directly over the end of the cutting shoe. Attach the liner to the cutting shoe (Fig. 4.2) before proceeding to Step 2.

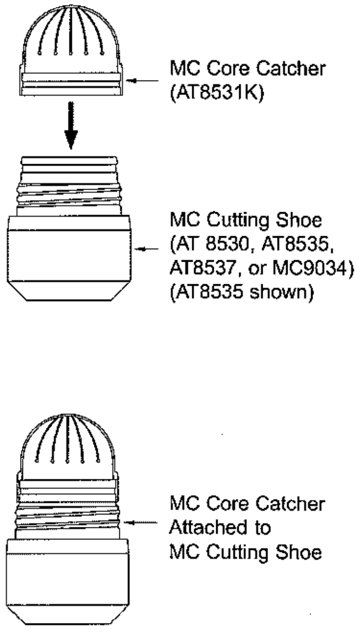


FIGURE 4.1
Core Catcher Attachment

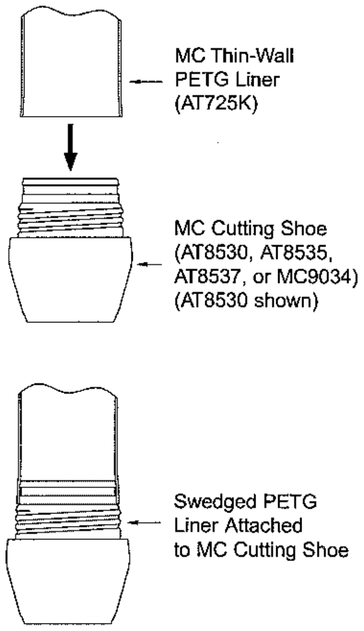


FIGURE 4.2
Thin-Wall Liner Attachment

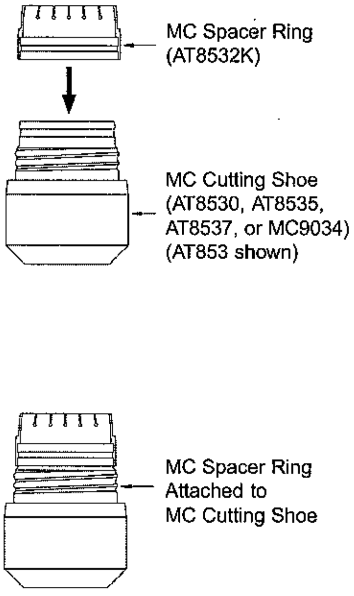


FIGURE 4.3
Spacer Ring Attachment

Refer to Figure 4.4 for identification of sampler parts and assembly sequence

2. Thread the cutting shoe into one end of an MC Sample Tube (Fig. 4.5). Tighten shoe with MC Combination Wrench (Fig. 4.6) until end of sample tube contacts machined shoulder of cutting shoe.

3. Insert a liner into the opposite end of the sample tube (Figure 4.7). The liner is all ready installed if using thin-wall PETG liners (AT725K) without an MC Core Catcher.

4. Thread an MC Drive Head into the top of the sample tube (Fig. 4.8) and securely tighten with the MC Combination Wrench (Fig. 4.9). Ensure that the end of the sample tube contacts the machined shoulder of the drive head.

Sampler Assembly is Complete.

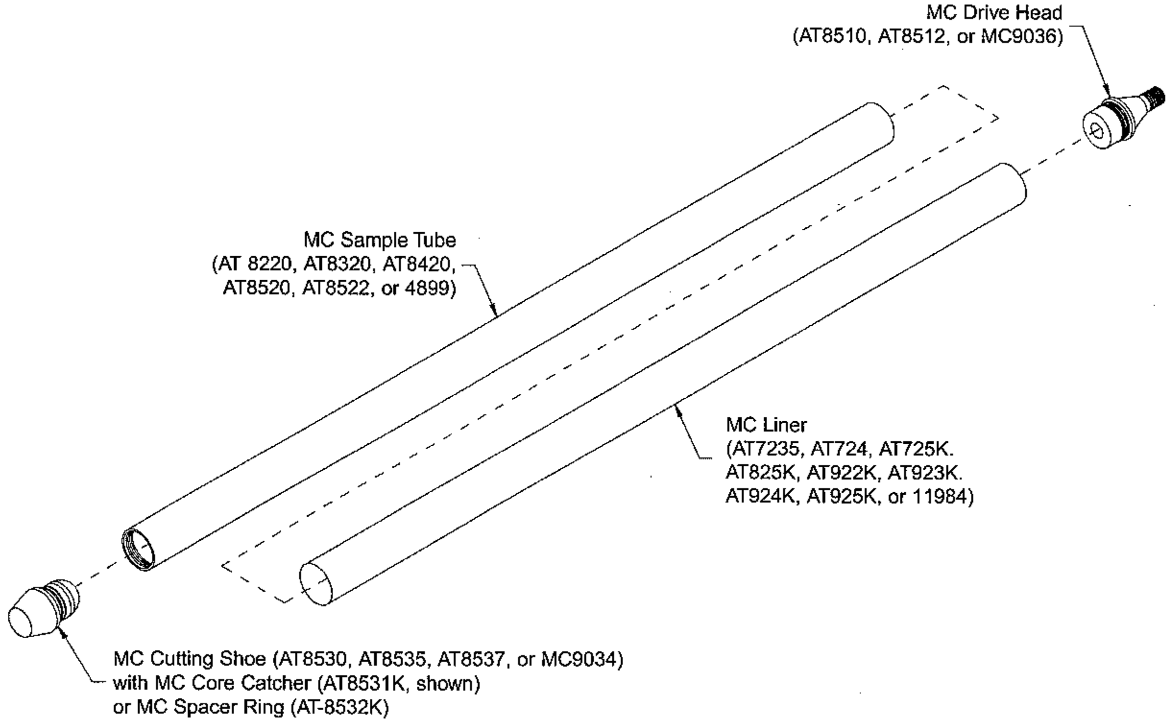


FIGURE 4.4
Macro-Core® Open-Tube Sampler Assembly

Figure 4.5. Thread an MC Cutting Shoe (shown with MC Core Catcher) into either end of a MC Sample Tube.

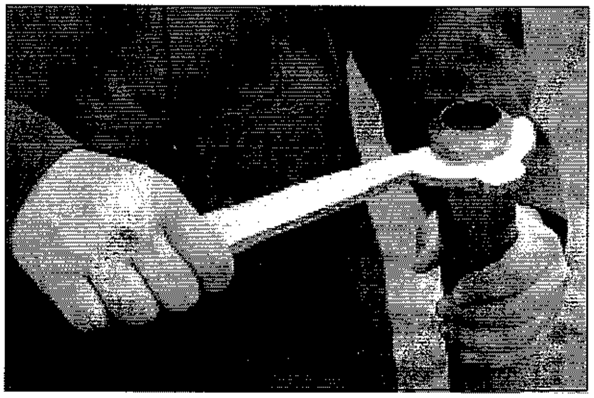


Figure 4.6. Tighten MC Cutting Shoe with MC Combination Wrench.

Figure 4.7. Insert liner into opposite end of MC Sample Tube.

Figure 4.8. Thread MC Drive Head into top of MC Sample Tube.

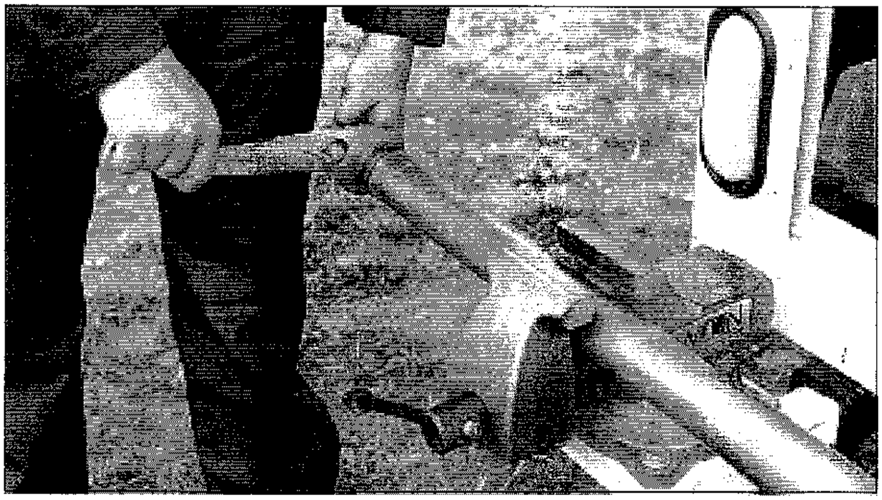


Figure 4.9. Tighten MC Drive Head with MC Combination Wrench. A vise is often used to hold the MC Sample Tube during this step.

4.4 Stop-Pin Coupler

The Stop-Pin Coupler attaches the Stop-Pin to the Piston Rod (Fig. 4.10). When connected together, these three parts form the Stop-Pin/Piston Rod Assembly. All three items may be ordered either individually or together as one complete assembly. Refer to Section 3.0 for specific assembly and item part numbers.

It is not always necessary to use the stop-pin coupler with the MC Piston Rod System. The coupler allows the piston rod to be removed from the sampler along with the stop-pin so that sample recovery is not hindered by the weight of the piston rod. If you find that recovery is not a problem with the formation you are sampling (such as clays), do not use the stop-pin coupler.

If sampling in formations where sample recovery may be a problem (such as loose sands), the stop-pin coupler is highly recommended. Removing the piston rod with the stop-pin significantly reduces the amount of tooling weight that the soil core must support as the sampler is driven. Sample compression is also reduced when the stop-pin coupler is utilized.

Instructions for connecting the stop-pin coupler to the stop-pin and piston rod are given below.

1. Hold a piston rod in vertical position with leading end resting on a solid surface.
2. Place a Stop-Pin Coupler on top of the Piston Rod and tap with a hammer to seat (Fig. 4.11).
3. Snap a Stop-Pin into the coupler using a hammer or 12-inch probe rod and drive cap (Fig. 4.12).

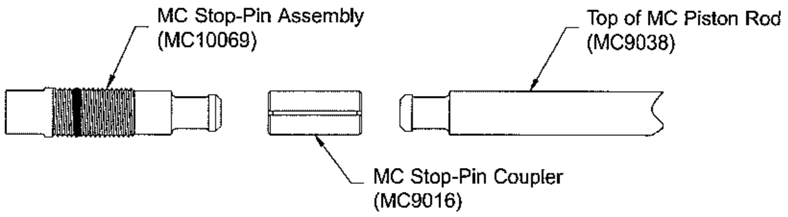


FIGURE 4.10
MC Stop-Pin Coupler Attaches MC Stop-Pin to MC Piston Rod

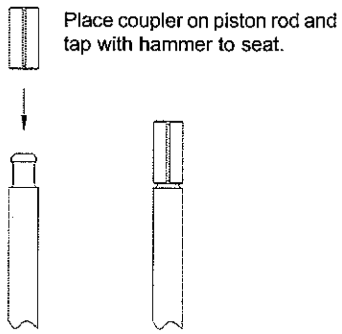


FIGURE 4.11
Tap Stop-Pin Coupler onto Piston Rod

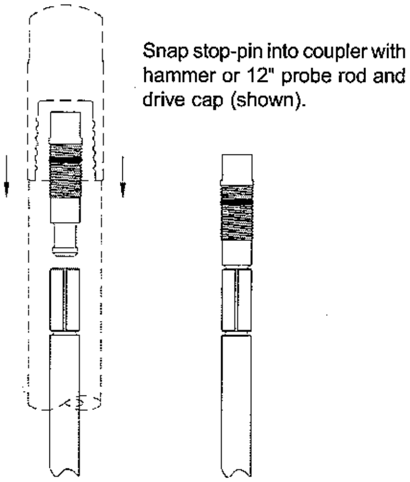


FIGURE 4.12
Tap Stop-Pin into Coupler with Probe Rod

4.5 MC Piston Rod Sampler (closed-point system) Assembly

The MC Piston Rod System seals the leading end of the sampler with a point assembly that is held in place with a piston rod and stop-pin. Once advanced to the top of the sampling interval, the stop-pin is removed with extension rods that are inserted down through the probe rod string. The piston rod will be extracted along with the stop-pin if a stop-pin coupler was used. Refer to Section 4.4 for help in determining when a stop-pin coupler is needed.

NOTE: The MC Piston Rod System requires an MC9036 MC Drive Head and an MC9034 MC Cutting Shoe. No other Macro-Core® drive heads or cutting shoes are compatible with this system. The larger 1.25-inch OD Probe Rods are also required to operate MC Piston Rod System.

1. Install an O-ring in the machined groove on the piston rod point (Fig. 4.13). Lubricate the O-ring with a small amount of deionized water.

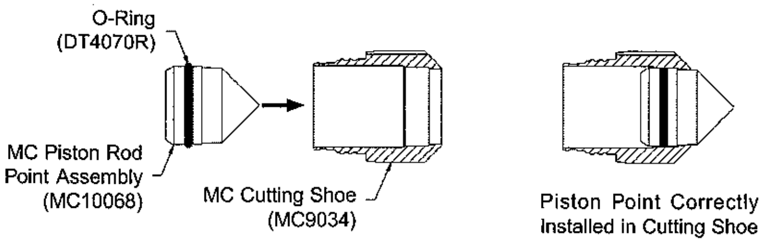


FIGURE 4.13
Installation of MC Piston Rod Point Assembly in MC Cutting Shoe

2. Push the piston rod point completely into the cutting shoe as shown in Figure 4.13.

3a. **(With MC Core Catcher)** Place the open end of a core catcher over the threaded end of the cutting shoe as shown in Figure 4.14. Apply pressure to the core catcher until it snaps into the machined groove on the cutting shoe.

NOTE: AT725K (thin-wall PETG) liners have a swedged end that is slipped directly over the groove in the cutting shoe (Fig. 4.15). To use a core catcher with these liners, simply cut approximately 0.25 inches (6 mm) of material from the swedged end of the liner and continue to Step 4.

3b. **(Without Core Catcher)** Push the base of an MC Spacer Ring onto the threaded end of the cutting shoe until it snaps into place (Fig. 4.16).

NOTE: With the exception of AT725K (thin-wall PETG) liners, all liners must utilize either a spacer ring or core catcher. Thin-wall liners have a swedged end which slides directly over the end of the cutting shoe. If using thin-wall liners, attach the liner to the cutting shoe (Fig. 4.15) before proceeding.

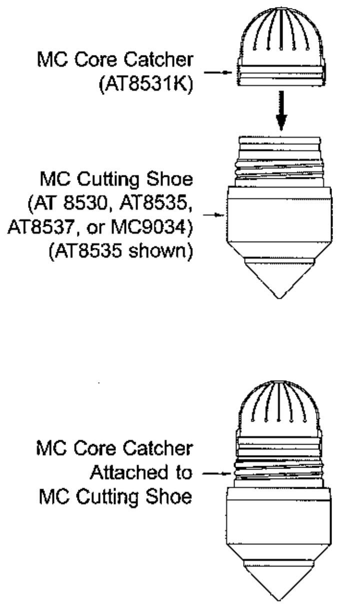


FIGURE 4.14
Core Catcher Attachment With Point Assembly

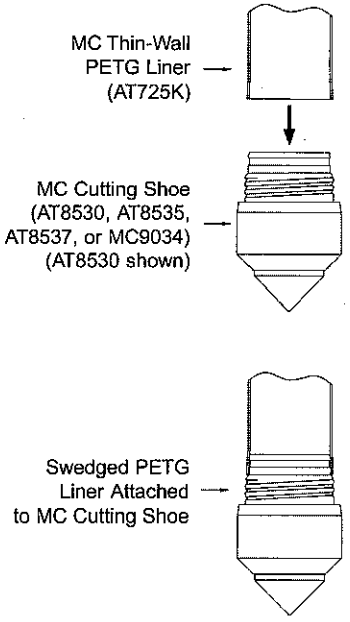


FIGURE 4.15
Thin-Wall Liner Attachment With Point Assembly

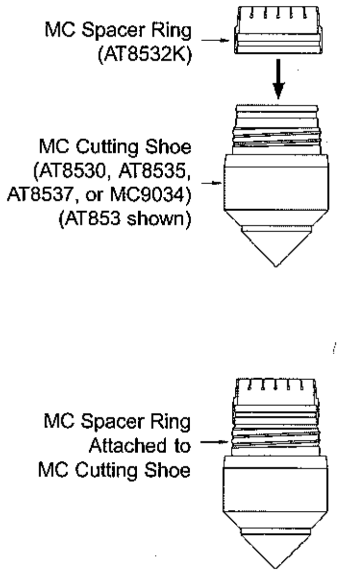


FIGURE 4.16
Spacer Ring Attachment With Point Assembly

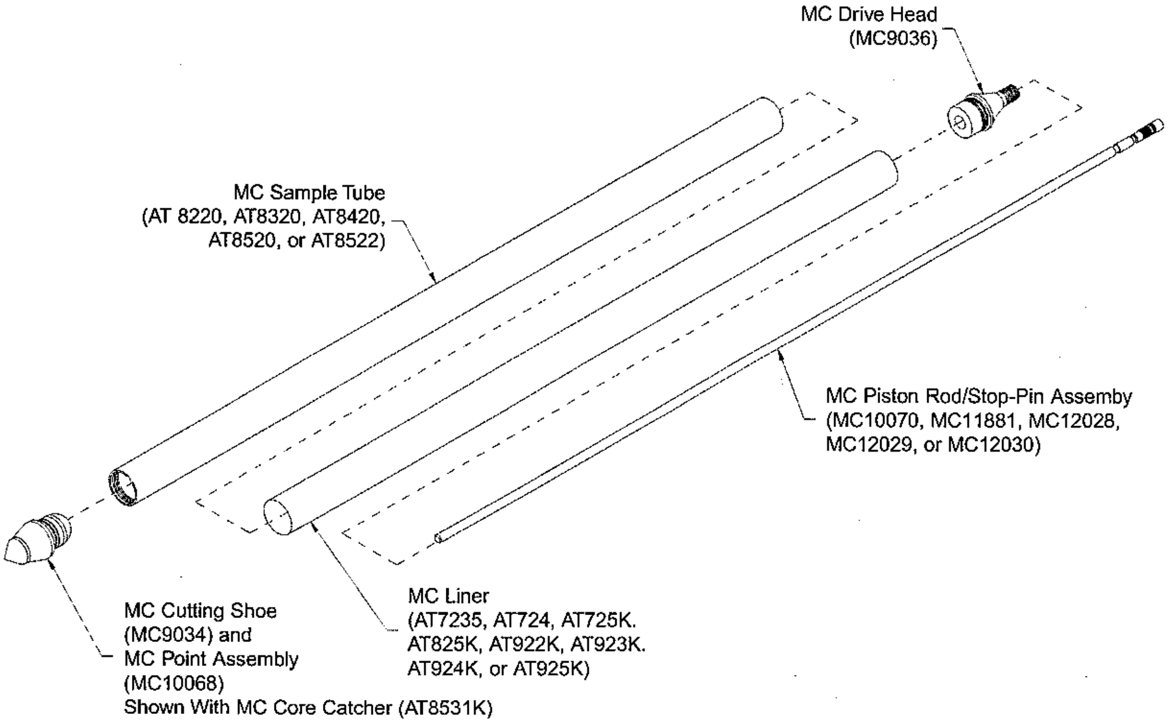


FIGURE 4.17
Macro-Core® Closed-Point Sampler Assembly

Refer to Figure 4.17 for identification of sampler parts and assembly sequence

4. Thread the cutting shoe (with point) into one end of an MC Sample Tube. Tighten until the end of the sample tube contacts the machined shoulder of the cutting shoe.

5. Insert an appropriate MC Liner into the sample tube (Fig. 4.18). The liner is all ready installed if using thin-wall PETG liners without a core catcher.

6. Thread an MC Drive Head into the top of the sample tube (Fig. 4.19) and securely tighten with the combination wrench (Fig. 4.20) until the end of the sample tube contacts the machined shoulder of the drive head.

(continued on Page 16)

Figure 4.18. Insert liner into opposite end of MC Sample Tube.

Figure 4.19. Thread MC Drive Head into top of MC Sample Tube.

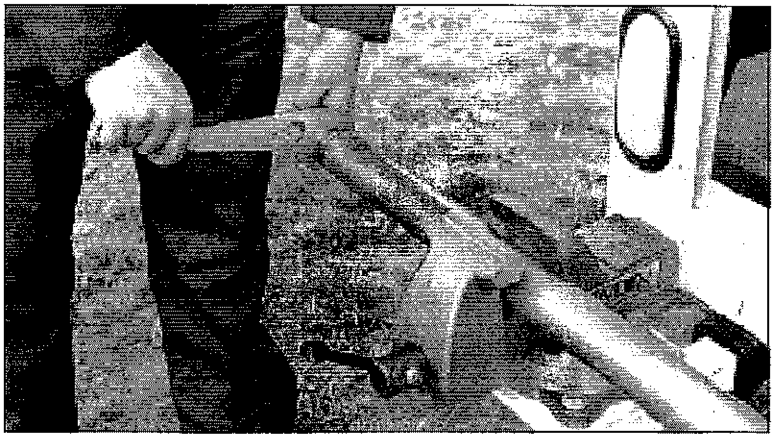


Figure 4.20. Tighten MC Drive Head with MC Combination Wrench. A vise is often used to hold the MC Sample Tube during this step.

7. Insert an MC Piston Rod/Stop-Pin Assembly through the drive head until the stop-pin threads contact the top of the drive head (Fig. 4.21). Ensure that an O-ring has been placed on the stop-pin.

   The leading end of the piston rod may hangup on the core catcher during assembly. When this happens, raise the assembly 6-8 inches above the core catcher and then allow the assembly to fall back down into the sampler. This should allow the piston rod to pass through the fingers of the core catcher.

   Note: The MC Stop-Pin Coupler may be omitted under certain sampling conditions. Refer to Section 4.4 for information regarding when a coupler is needed and instructions for coupler installation.

8. Thread the stop-pin into the drive head (left-hand threads) with an adjustable or 1/2-inch combination wrench. Fully tighten the stop-pin and then back it off slightly (~10 degrees). This avoids locking the stop-pin threads and allows it to later be unthreaded from the ground surface with extension rods.

Sampler Assembly is Complete.

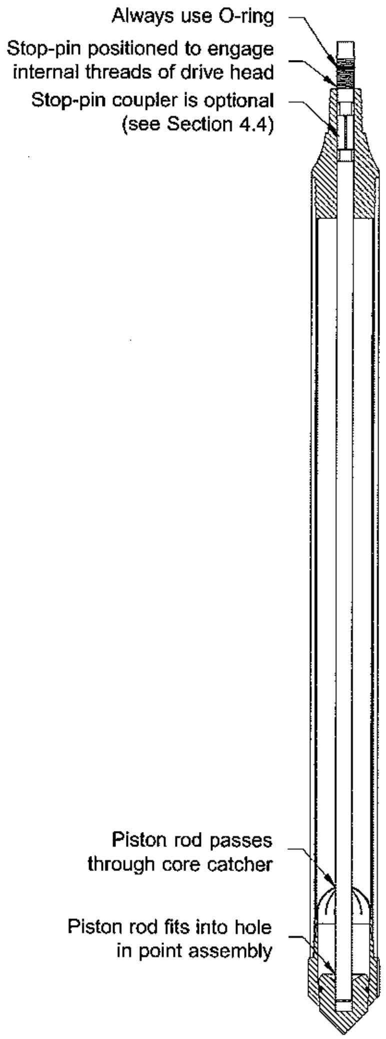


FIGURE 4.21
MC Piston Rod/Stop-Pin Assembly Installs Through MC Drive Head

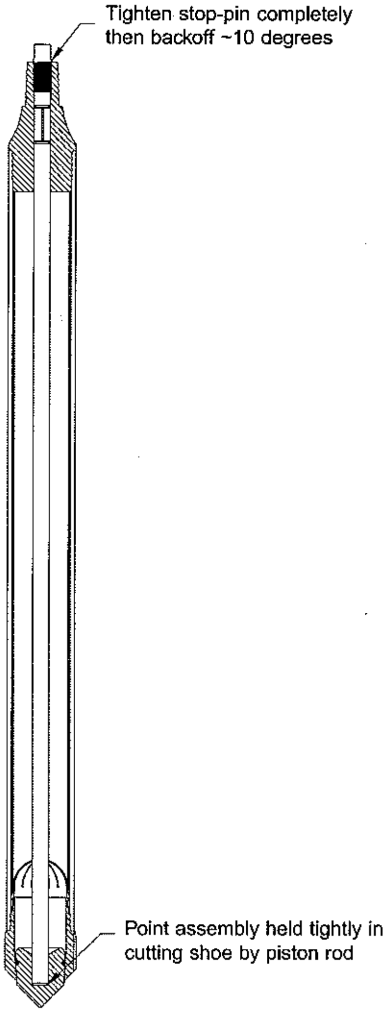


FIGURE 4.22
Thread MC Stop-Pin tachment with Piston Assembly

4.6 Pilot Hole

A pilot hole prevents excessive sampler wear in tough soils and saves time when a discrete soil core is desired. The pilot hole is created by driving a 2.0-, 2.5-, or 3.0-inch MC Pre-Probe (see Section 3.0 for part numbers) to the top of the sampling interval. Soil surfaces containing gravel, asphalt, hard sands, or rubble should be pre-probed to reduce wear on the cutting shoe and to avoid damage to the sampler. To save time when collecting a discrete soil core, pre-probe to the sampling interval rather than coring to depth with the sampler.

4.7 Open-Tube Sampling

The Macro-Core® Open-Tube Sampler is used to gather continuous soil cores beginning from ground surface. A representative soil sample is obtained by driving the assembled sampler one sampling interval into the subsurface through undisturbed soil. Upon retrieving the sampler, the liner and soil core are removed. The sampler is then properly decontaminated, reassembled with a new liner, and inserted back down the same hole to collect the next soil core.

Instructions for operationg of the Open-Tube Macro-Core® Sampler are given in this section.

1. Thread a Drive Cap (AT1200) onto the drive head of an assembled Open-Tube Macro-Core® Sampler as shown in Figure 4.23. (Refer to Section 4.3 for sampler assembly).

2. Raise the probe unit hammer assembly to its highest position by fully extending the probe cylinder.

3. Position the MC Sampler for driving as shown in Figure 4.24. Place the sampler directly under the hammer with the cutting shoe centered between the toes of the probe foot. The sampler should now be parallel to the probe derrick. Step back from the unit and visually check sampler alignment.

4. Apply static weight and hammer percussion to advance the sampler until the drive head reaches the ground surface (Fig. 4.25A)

   NOTE: Activate hammer percussion whenever collecting soil. Percussion helps shear the soil at the leading end of the sampler so that it moves into the sample tube for increased recovery.

5. Raise the hammer assembly a few inches to provide access to the top of the sampler.

6. Remove the drive cap and thread a Pull Cap (AT1204) onto the sampler drive head.

7. Lower the hammer assembly and hook the hammer latch over the pull cap (Fig. 4.26). Raise the hammer assembly to pull the sampler completely out of the ground.

8. Procede to Section 4.9 for instructions on recovering the soil core from the MC Sampler.

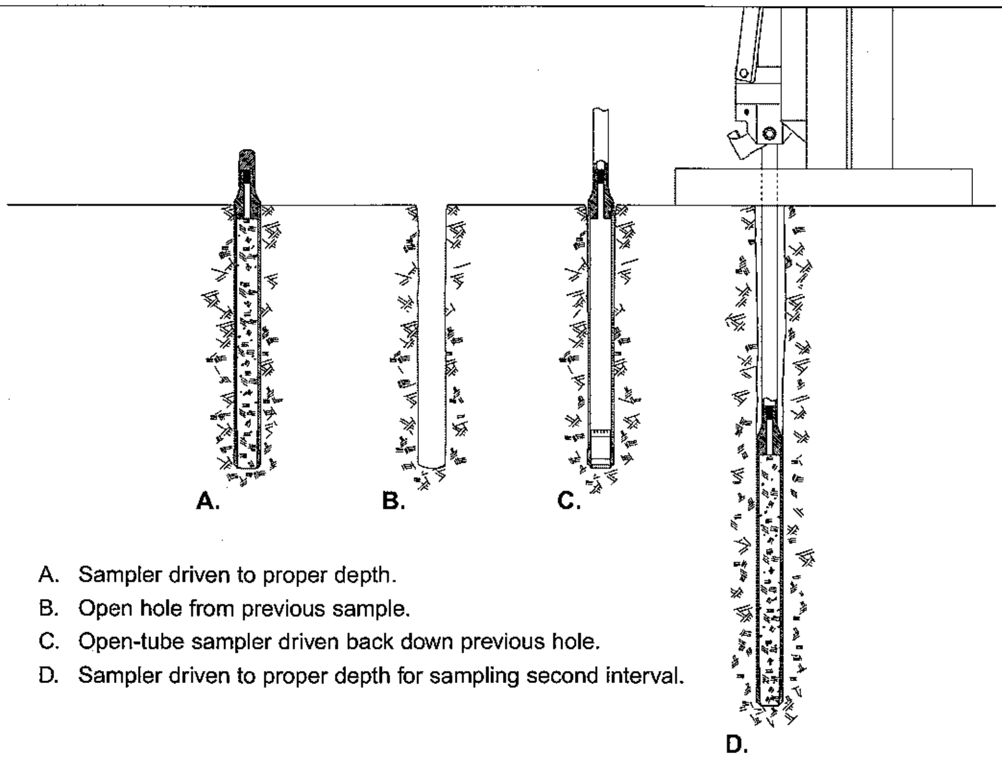
To sample consecutive soil cores, advance a clean sampler down the previously opened hole (Fig. 4.25B) to the top of the next sampling interval (Fig. 4.25C). Drive the tool string the length of the sampler to collect the next soil core (Fig. 4.25D). Switch to an MC Piston Rod Sampler if excessive side slough is encountered.

NOTE: Use caution when advancing or retrieving the sampler within an open hole. Low side friction may allow the sampler and probe rods to drop down the hole when released. To prevent equipment loss, hold onto the tool string with a pipe wrench when needed.

Figure 4.23. Thread drive cap onto sampler drive head.

Figure 4.24 MC Sampler positioned for driving into subsurface.

Figure 4.26. Hook hammer latch onto pull cap.



A. Sampler driven to proper depth.
B. Open hole from previous sample.
C. Open-tube sampler driven back down previous hole.
D. Sampler driven to proper depth for sampling second interval.

FIGURE 4.25
Phases of Macro-Core® Open-Tube Soil Sampling

4.8 Closed-Point Sampling with the MC Piston Rod System

Material collapsing from the probe hole sidewall can make it difficult to collect representative soil cores from significant depths with an open-tube sampler. To overcome this problem, the Macro-Core® Sampler can be equipped with a point assembly that is held tightly in the cutting shoe with a piston rod and threaded stop-pin. This allows the sealed sampler to pass through the slough material and then opened at the appropriate sampling interval. Intructions for sampling with the MC Piston Rod System are given in this section.

NOTE: The MC Piston Rod System is designed for continuous core sampling. A probe hole must be opened above the sampling interval either by removing soil with an open-tube Macro-Core® Sampler or by preprobing to depth. Never drive the MC Piston Rod System through undisturbed soil.

1. Attach a Slotted Drive Cap (AT1202) to the drive head of an assembled MC Piston Rod Sampler as shown in Figure 4.27. (Refer to Section 4.5 for sampler assembly.)

   NOTE: The MC Stop-Pin extends slightly from the top of the MC Drive Head. A slotted drive cap is therefore required to allow room for the stop-pin (Fig. 4.27). A standard drive cap may be used once probe rods are added to the tool string.

2. Raise the probe unit hammer assembly to its highest position by fully extending the probe cylinder.

3. Place the leading end of the MC Sampler into the **previously opened hole** (Fig. 4.28A).

4. Advance the sampler down the open hole for the full stroke of the probe machine.

   NOTE: Use caution when advancing the sampler down an open hole. Low side friction may allow the sampler and probe rods to drop down the hole when released. To prevent equipment loss, hold onto the tool string with a pipe wrench when needed.

5. Remove the slotted drive cap and thread a probe rod onto the MC Drive Head. Thread a standard Drive Cap (AT1200) onto the probe rod.

6. Continue advancing the sampler and adding probe rods to the tool string until the desired sampling interval is reached (Fig. 4.28B).

7. Raise the hammer assembly and retract the probe derrick to gain access to the top probe rod.

8. Remove the drive cap and insert extension rods down the inside of the probe rod string. A male Extension Rod Quick Link and an MC Extension Rod Quick Link Connector should be placed on the leading end of the extension rod string (Fig. 4.29) if an MC Stop-Pin Coupler was used during assembly. Nothing is placed on the leading extension rod if a stop-pin coupler was not used.

   Use Extension Rod Couplers or Extension Rod Quick Links (Fig. 4.30) to connect extension rods together until the leading rod contacts the stop-pin . Use an Extension Rod Jig (Fig. 4.30) to hold the down-hole rods while adding more rods to the string.

9. Attach an Extension Rod Handle (Fig. 4.30) to the rod string and slowly rotate the handle clockwise to engage the stop-pin threads. The rods will become harder to turn when the stop-pin threads are fully engaged. Pull up on the rod string to ensure that it is connected to the stop-pin. Continue rotating and periodically lifting the extension rods until the stop-pin is completely unthreaded from the drive head.

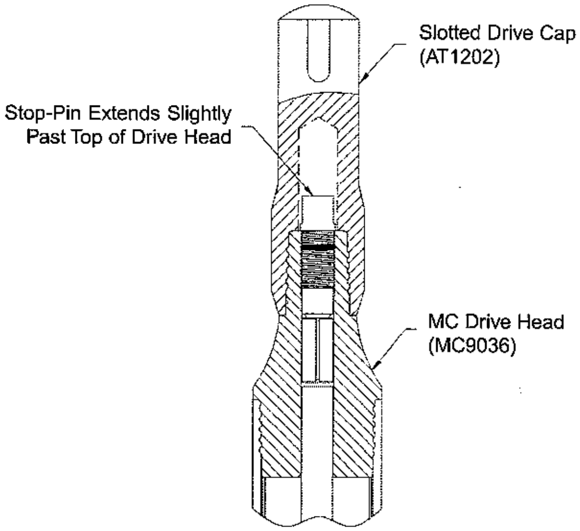
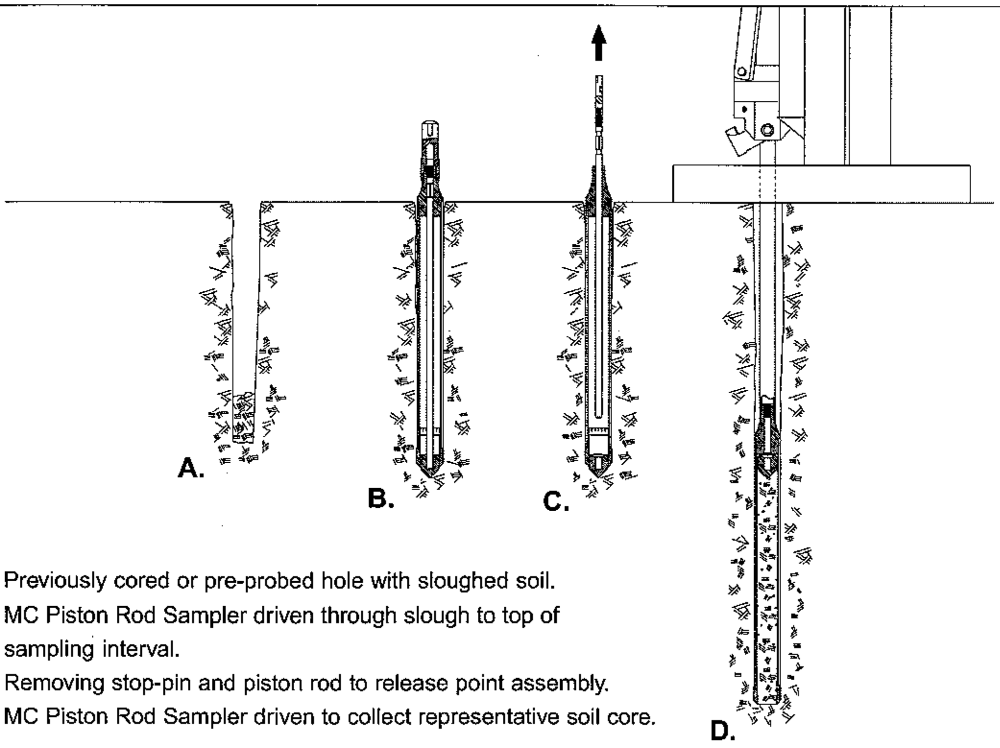


FIGURE 4.27

Slotted Drive Cap Accomodates Stop-Pin



A. Previously cored or pre-probed hole with sloughed soil.
B. MC Piston Rod Sampler driven through slough to top of sampling interval.
C. Removing stop-pin and piston rod to release point assembly.
D. MC Piston Rod Sampler driven to collect representative soil core.

FIGURE 4.28

Phases of Macro-Core® Closed-Point (Piston Rod System) Sampling

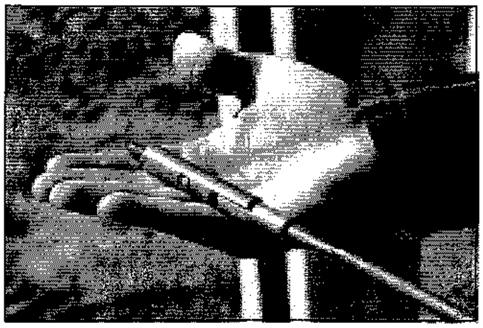


Figure 4.29. Use an MC Extension Rod Quick Link Connector if stop-pin coupler was used in sampler.

NOTE: If the stop-pin is excessively difficult to unthread, pull the entire tool string up approximately 2 inches. This should relieve the force exerted on the point assembly and make releasing the stop-pin much easier.

10. Lift and remove extension rods until the stop-pin is visible above the drive head (Fig. 4.28-C). The stop-pin and piston rod will both be removed from the sampler if a stop-pin coupler was used during assembly (Fig. 4.31-A). Only the stop-pin will be connected to the last extension rod if a coupler was not used (Fig. 4.31-B). Remove the extension rod and stop-pin if the piston rod is not attached.

11. If the piston rod is attached to the stop-pin, carefully unhook the extension rod and male quick link from the MC Extension Rod Quick Link Connector (Fig. 4.31-A). Take care not to deform the stop-pin coupler when removing the extension rod. Now remove the piston rod from inside the tool string.

12. Thread the Drive Cap (AT1200) onto a probe rod and then attach the probe rod to the tool string.

13. Completely raise the probe unit hammer assembly and reposition the probe derrick over the tool string.

14. Apply static weight and hammer percussion to advance the tool string the length of the sampler and collect the soil core (Fig. 4.28-D).

    NOTE: Activate hammer percussion whenever collecting soil. Percussion helps shear the soil at the leading end of the sampler so that it moves into the sample tube for increased recovery.

15. Raise the hammer assembly a few inches to provide access to the top of the tool string.

16. Remove the drive cap and thread a Pull Cap (AT1204) onto the top probe rod.

17. Lower the hammer assembly and hook the hammer latch over the pull cap. Raise the hammer assembly to pull the first probe rod out of the ground. Remove the rod and place the pull cap on the next rod of the tool string. Continue pulling probe rods until the MC Sampler is brought to the ground surface.

    NOTE: Use caution when retrieving the MC Sampler from depth. Low side friction may allow the sampler and probe rods to drop down the hole when released. To prevent equipment loss, hold onto the tool string with a pipe wrench when needed.

18. Procede to Section 4.9 for instructions on recovering the soil core from the MC Sampler.

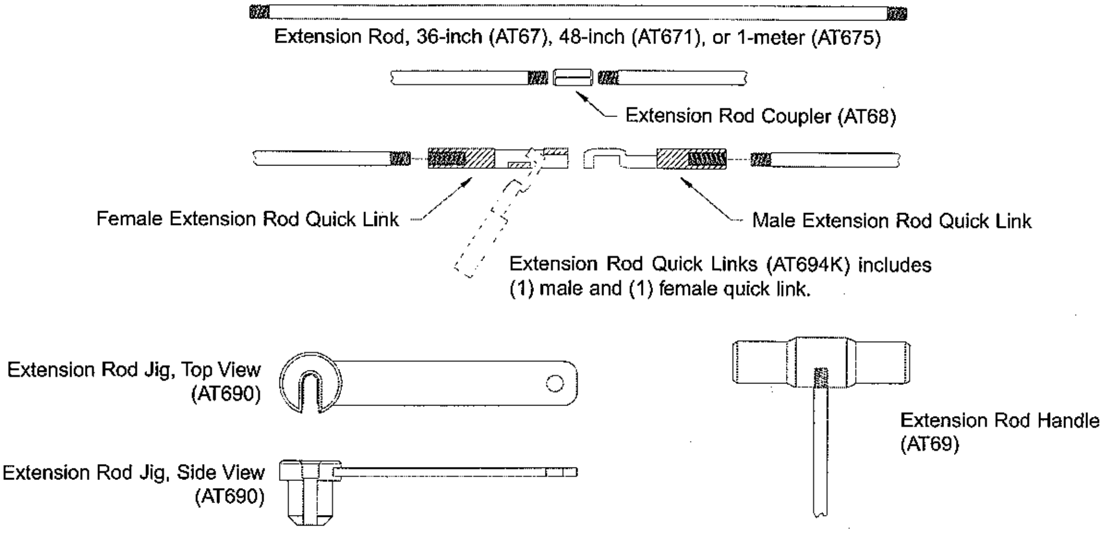


FIGURE 4.30

Extension Rods and Accessories

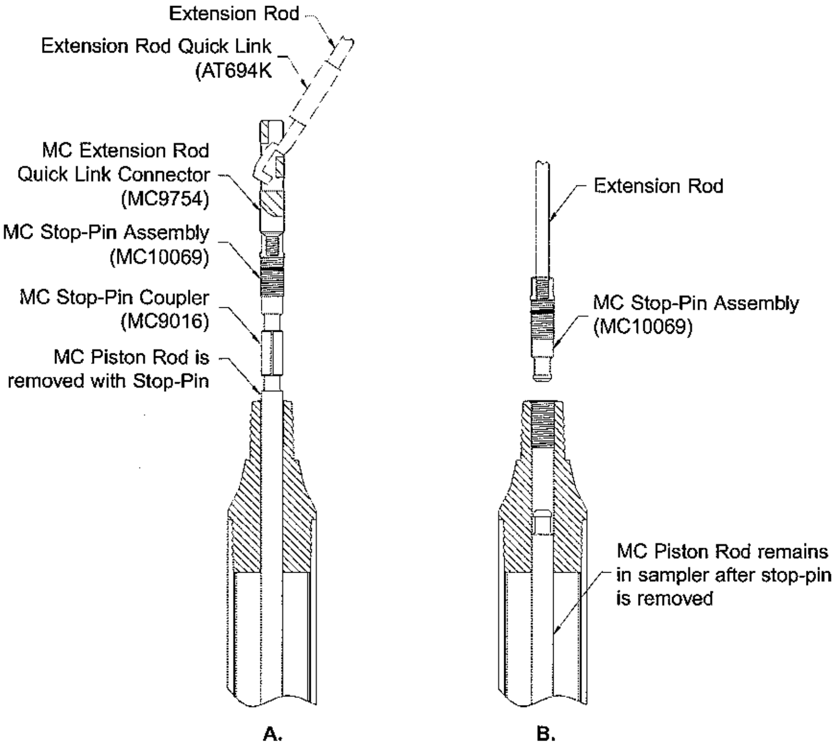


FIGURE 4.31

MC Piston Rod is Removed With Stop-Pin if Stop-Pin Coupler was Used

4.9 Soil Core Recovery

The soil sample is easily removed from the Macro-Core® Sampler by unthreading the cutting shoe and pulling out the liner. A few sharp taps on the cutting shoe with the combination wrench will often loosen the threads sufficiently to allow removal by hand. If needed, the exterior of the cutting shoe features a notch for attaching the combination wrench to loosen tight threads (Fig. 4.32). With the cutting shoe removed (Fig. 4.33), simply pull the liner and soil core from the sample tube (Fig. 4.34).

If the closed-point sampler is used, the MC Piston Rod Point Assembly is now retrieved from the end of the liner (Fig. 4.35). Secure the soil sample by placing a vinyl end cap on each end of the liner.

Undisturbed soil samples can be obtained from Teflon®, PVC, and PETG liners by splitting the liner. Geoprobe offers two tools for cutting sample liners. The MC Liner Cutter Kit (AT8000K) is used to make longitudinal cuts in the liner and includes a tool that holds the liner for cutting (Fig. 4.36). The MC Liner Circular Cutting Tool (AT8050) is used to segment the liner by cutting around the outside circumference of the liner (Fig. 4.37).

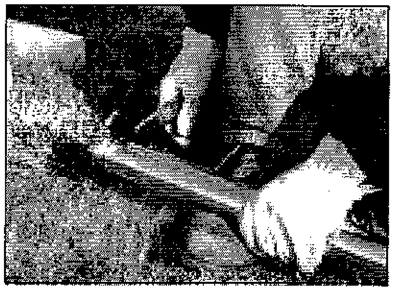


Figure 4.32. Loosening the MC Cutting Shoe with the MC Combination Wrench.

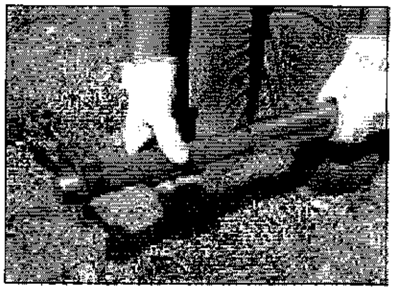


Figure 4.33. Removing MC Cutting Shoe and liner from MC Sampler Tube.

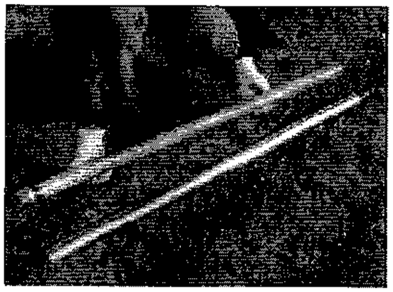


Figure 4.34. Macro-Core® liner filled with soil core.

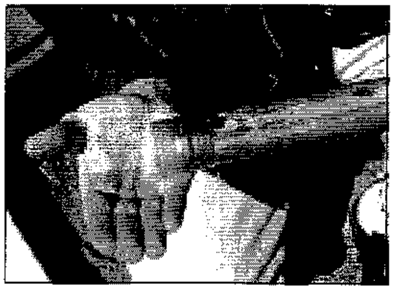


Figure 4.35. MC Piston Rod Point Assembly is retrieved from top of liner.

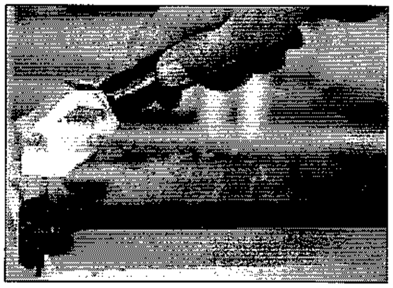


Figure 4.36. MC Liner Cutter makes two longitudinal cuts in polymer liners.

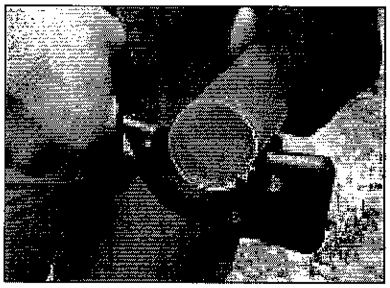


Figure 4.37. MC Circular Cutting Tool cuts around the outside of MC liner.

4.10 MC Piston Rod Sampler Tips

Macro-Core® Samplers are available in lengths of 24 inches, 36 inches, 1 meter, 48 inches, and 60 inches. This means that MC Sample Tubes, MC Liners, MC Piston Rods and MC Piston Rod/Stop-Pin Assemblies are also available in these five sizes. Keep this in mind when ordering Macro-Core® parts to ensure that the items you receive are of the appropriate length.

During development of the MC Piston Rod System, it was common for operators to remove the MC Piston Rod/Stop-Pin assembly from inside the probe rods with the last extension rod still threaded onto the stop-pin. The MC Stop-Pin Coupler is not designed to withstand the considerable side load placed on it by the extension rod and is easily damaged if the extension rod is allowed to swing around unsupported. The MC Quick Link Connector was developed to prevent damage to the coupler by allowing the last extension rod to be disconnected from the piston rod/stop-pin assembly before removing the assembly from the probe rods. Always use the quick link connector whenever the sampler is assembled with a stop-pin coupler.

4.11 Tips to Maximize Sampling Productivity

The following suggestions are based on the collective experiences of Geoprobe operators:

1. Organize your truck or van. Assign storage areas to all tools and equipment for easy location. Transport sample tubes, piston rods, extension rods, probe rods, and liners in racks. Above all, minimize the number of items lying loose in the back of the vehicle.

2. Take three or four samplers to the field. This allows the collection of several samples before stopping to clean and decontaminate the equipment. A system is sometimes used where one individual operates the probe while another marks the soil cores and decontaminates the used samplers.

3. A machine vise is recommended. With the sampler held in a vise, the operator has both hands free to remove the cutting shoe (Fig. 4.38), drive head, and sample liner (Fig. 4.39). Cleanup is also easier with both hands free. Geoprobe offers an optional Machine Vise (FA300) that mounts directly on the probe derrick (Fig. 4.40).

4. Extension Rod Quick Links (Fig. 4.41) are real time savers. A good method for deploying extension rods is to assemble sections of up to three rods using threaded connnectors. Each section is then connected with Quick Links so that up to three rods can be added or removed from the string at once.

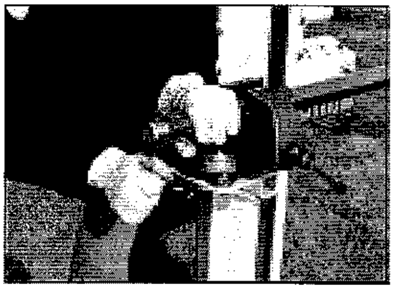


Figure 4.38. Removing MC Cutting Shoe with sample tube held in machine vise.

Figure 4.39. Removing filled liner with sample tube held in machine vise.

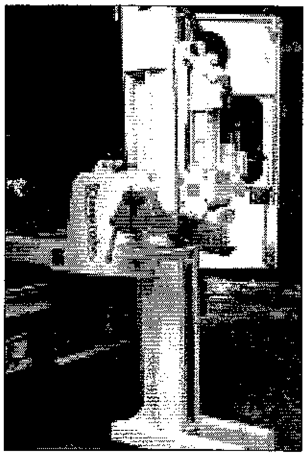


Figure 4.40. Machine vise mounted directly on Geoprobe Soil Probing Unit.

Figure 4.41. Using Extension Rod Quick Links to connect Extension Rods.

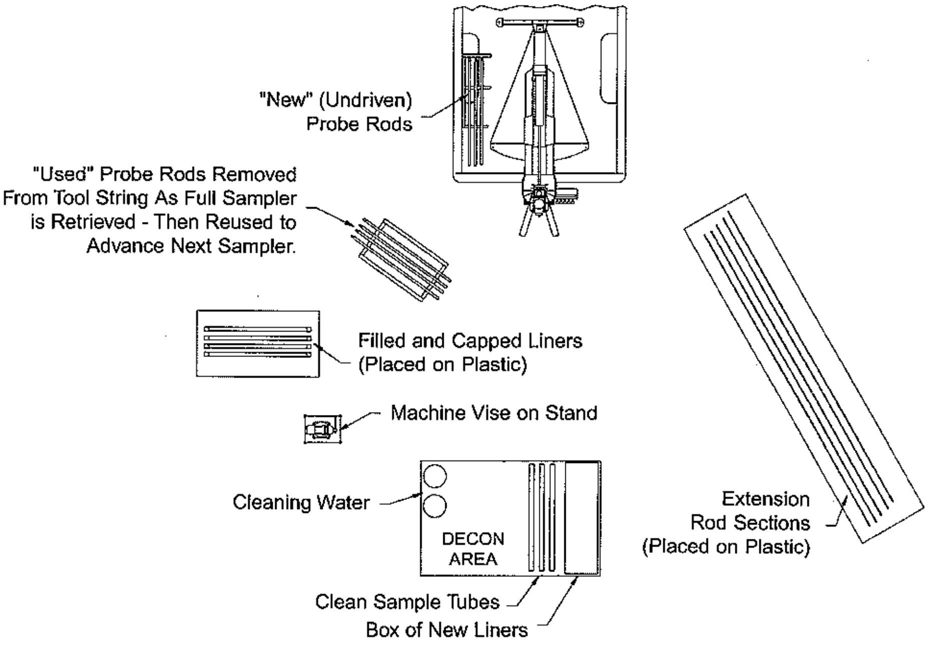


FIGURE 4.42
Equipment Layout Example to Maximize Sampling Productivity.

5. When releasing the stop-pin, a pair of locking pliers can be used to turn the extension rods. Locking pliers may be quicker and easier to install than the extension rod handle.

6. Organize your worksite. Practice with the sampler to identify a comfortable setup and then use this layout whenever sampling. An example layout is shown in Figure 4.42.

   A collapsible table or stand is handy to hold decontaminated sampler tubes and liners. Equipment may also be protected from contamination by placing it on a sheet of plastic on the ground.

   Instead of counting probe rods for each trip in-and-out of the probe hole, identify separate locations for "new" rods and "used" rods. Collect the first sample from the open hole using "new" rods. As each probe rod is removed during sampler retrieval, place it in the "used" rod location. Now advance a clean sampler back down the same hole using all of the rods from the "used" location. Add one "new" rod to the string and then drive the tools to collect the next soil core. Once again, remove each probe rod and place it in the "used" rod location as the sampler is retrieved. Repeat this cycle using all the "used" rods to reach the bottom of the probe hole, and one "new" rod to fill the sampler.

7. Cleanup is very important from the standpoint of operation as well as decontamination. Remove all dirt and grit from the threads of the drive head, cutting shoe, and sample tube with a nylon brush (BU700). Without sufficient cleaning, the cutting shoe and drive head will not thread completely onto the sample tube. The threads may be damaged if the sampler is driven in this condition.

Ensure that all soil is removed from inside the sample tube. Sand particles are especially troublesome as they can bind liners in the sampler. Full liners are difficult to remove under such conditions. In extreme cases the soil sample must be removed from the liner before it can be freed from the sample tube.

8. Although MC Drive Heads are available for open-tube sampling with 1.0-inch OD probe rods, 1.25-inch rods are recommended for the Macro-Core® Sampler. The larger rod diameter limits downhole deflection of the tool string and ultimately provides a more durable system. The double-lead thread design also makes the 1.25-inch rods thread together faster than previous 1-inch probe rods.

9. The Heavy-Duty MC Cutting Shoe (AT8535) is machined with more material at the critical wear areas. It can be used in place of the Standard MC Cutting Shoe (AT8530) and is designed to lengthen service life under tough probing conditions.

   Expansive clays and coarse sands can "grab" and collapse liners as the sample tube is filled with soil. A 1/8-inch Undersized MC Cutting Shoe (AT8537) helps alleviate this problem. The smaller core (1.375 inches OD) allows expanding clays and coarse sands to travel past the liner without binding.

   The standard, heavy-duty, and undersized cutting shoes will not accept the MC Piston Rod Point Assembly (MC10068). Only the MC9034 cutting shoe is compatible with the MC Piston Rod System.

10. Maximize the thread life of the sample tube by varying the ends in which the drive head and cutting shoe are installed. The dynamic forces developed while driving the sampler are such that the threads at the drive head wear more quickly than at the cutting shoe. Regularly switching ends will maintain relatively even wear on the sample tube.

5.0 REFERENCES

Geoprobe Systems, September, 1997, "97-98 Tools and Equipment Catalog."

Geoprobe Systems, May, 1995, "1995-96 Tools and Equipment Catalog."

Equipment and tool specifications, including weights, dimensions, materials, and operating specifications included in this brochure are subject to change without notice. Where specifications are critical to your application, please consult Geoprobe Systems 1-800-436-7762.

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