CULTURAL RESOURCE ASSESSMENT

CROTON WATER TREATMENT PLANT

MOSHOLU GOLF COURSE, VAN CORTLANDT PARK

BRONX, NEW YORK

Cultural Resource Assessment
Croton Water Treatment Plant
Mosholu Golf Course
Van Cortlandt Park
Bronx County
New York

Prepared For:

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May 2004

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1 EXECUTIVE SUMMARY

The New York City Department of Environmental Protection (NYCDEP) proposes to design, construct and place into operation a 290 million-gallon-per-day (mgd) Croton Water Treatment Plant (WTP) to provide filtration and disinfection of the Croton Water System. The project would also include the construction of new raw water and finished water tunnels to connect the proposed plant to the New Croton Aqueduct (NCA), and improvements and rehabilitation of structures related to distribution connections at and near Jerome Park Reservoir. The purpose of completing the Final Supplemental Environmental Impact Statement (SEIS) is to evaluate three sites for the water treatment plant: the Eastview Site in the Town of Mount Pleasant, Westchester County, the Mosholu Site in the Bronx, Bronx County, and the Harlem River Site, also in the Bronx, Bronx County and determine the preferred site for the WTP. Some alternatives include work at other sites along the NCA, and one alternative includes a future connection to the proposed Kensico-City Tunnel. This project description provides details relating to construction and operation of the proposed plant at the Mosholu Site.

The Croton WTP would be located at the Mosholu Golf Course and Driving Range. The site is located within the 1,146-acre Van Cortlandt Park in the Borough of the Bronx, New York. This site is owned by New York City and is under the jurisdiction of the NYC Department of Parks and Recreation (NYCDPR). The Golf Course and driving range are bound by the Mosholu Parkway and Major Deegan Expressway to the west and north, Jerome Avenue and the Interborough Rapid Transit (IRT) No. 4 elevated train (the Woodlawn station) to the east, and West Gun Hill Road to the south. The Golf Course and driving range comprise approximately 74 acres of the 1,146-acre park. The proposed project would be situated under a portion of the 13-acre driving range. Total ground disturbance during construction including staging area, access road, utility trenching etc. will be approximately 29.3 acres. During construction, the Golf Course would remain open with a temporary clubhouse, driving range, and parking facilities made available through the Shandler Recreation Area to the north, adjacent to the Golf Course and driving range. The temporary Golf Course would be a modification of the existing one, and would still have 9 holes open to the public during the construction period. Following construction, these facilities would be replaced with a new Golf Course clubhouse, maintenance facility, and new Golf Course parking lot. The nine-hole Golf Course would be replaced with an 18-hole "Executive" (short-hole) course with a possible alternative of a nine-hole Golf Course in the future.

1.1 HISTORIC RESOURCES

The land that now comprises Van Cortlandt Park was acquired by New York City as parkland in 1888. Although it is historically important, no formal process has been undertaken to definitively determine its eligibility for landmark status. However, a detailed account of the park's history, structures, and existing conditions in 1986 was prepared by Storch Associates, Westbury, New York, and is on file with the New York City Landmarks Preservation Commission (LPC).

The Mosholu Golf Course was created in 1914 but was considerably altered in the 1930s. Although the proposed project would result in a temporary visual alteration of the Golf Course, it is not considered to have a significant adverse impact on historic resources since the driving range and Golf Course would be rebuilt.

The Mosholu Golf Course Clubhouse, although probably not eligible for listing on the National Register as an individual structure, is of historical note. The Olmsted Center currently maintains a file on the structure. The building is reminiscent, on a small scale, of the grand clubhouses erected at private suburban golf courses, but this was accomplished through architectural renovations in the 1970s. The building is a brick Colonial Revival structure built in 1928. The most notable features of the building are the entrance portico and the gables, but these were added in 1971. While photo-documentation of the existing building is not necessary, it is at the discretion of the review agency. However, it would be difficult to capture the look and feel of the 1928 clubhouse due to the substantial 1971 additions to the sides and front of the structure.

The proposed WTP would be visually and physically separated from any historic and/or landmarked structures within the park or the surrounding area (e.g., Van Cortlandt Mansion, Vault Hill, and Woodlawn Cemetery). Therefore no significant impacts to existing historic structures are expected.

Construction would entail connections with the buried NCA, a National Register eligible structure. The Aqueduct is still in active use and rehabilitation of a portion of it would be necessary. Due to the eligible listing of the NCA, prior to construction, SHPO and the Secretary of the Interior's Standards for the Treatment of Historic Properties would be consulted to retain the historic character of the structures. This consultation would ensure that any future proposed work would not cause any significant adverse impact to the historic structures.

1.2 ARCHAEOLOGICAL RESOURCES

Although there has been ground disturbance and a continuously evolving recreational landscape, there is still a potential for precontact and historical archaeological resources to have remained undisturbed. Consequently, if the Mosholu Site were selected for the WTP, a Phase 1B investigation would be conducted by a pre-qualified specialist in accordance with the New York Archaeological Council's Standards (1994) to verify the presence or absence of archaeological deposits. A protocol for the Phase 1B field investigation would be prepared under separate cover, and would be submitted to SHPO. The Phase 1B field investigation would occur prior to any construction-related excavation on the site. These investigations and the subsequent mitigation of any findings would avoid any significant adverse impacts to archaeological resources.

2 INTRODUCTION

The New York City Department of Environmental Protection (NYCDEP) proposes to design, construct and place into operation a 290 million-gallon-per-day (mgd) Croton Water

Treatment Plant (WTP) to provide filtration and disinfection of the Croton Water System. The project would also include the construction of new raw water and finished water tunnels to connect the proposed plant to the New Croton Aqueduct (NCA), and improvements and rehabilitation of structures related to distribution connections at and near Jerome Park Reservoir. The purpose of completing the Draft Supplemental Environmental Impact Statement (SEIS) is to evaluate three sites for the water treatment plant: the Eastview Site in the Town of Mount Pleasant, Westchester County, the Mosholu Site in the Bronx, Bronx County, and the Harlem River Site, also in the Bronx, Bronx County. Some alternatives include work at other sites along the NCA, and one alternative includes a future connection to the proposed Kensico-City Tunnel. This report provides details relating to construction and operation of the proposed plant at the Mosholu Site (Figure 1).

Construction of a proposed Croton WTP at the Mosholu Site would include a new raw water tunnel to convey untreated water from the New Croton Aqueduct (NCA) to the water treatment plant site; a raw water pumping station; a main treatment building that would house all the process elements, administrative offices, a conference room, a small process laboratory, maintenance and storage facilities, electrical and heating, ventilation and air conditioning (HVAC) rooms; a treated water pumping station; and a new treated water tunnel to convey treated water from the proposed plant back to Jerome Park Reservoir (JPR) and the City's distribution system. During construction, an approximately 800-foot long ornamental wall would be constructed along Jerome Avenue that would provide a visual barrier and aid in noise attenuation. In addition, construction of the proposed plant would require the rehabilitation and stabilization of several off-site Croton System facilities. The off-site location points where activity would occur include the following: Gate House No. 1 (Bronx, NY) and modifications to the facilities in and around the Jerome Park Reservoir (Bronx, NY).

The Croton WTP would be located at the Mosholu Golf Course and Driving Range. The site is located within the 1,146-acre Van Cortlandt Park in the Borough of the Bronx, New York (Figures 1, 2). This site is owned by the City and is under the jurisdiction of the NYC Department of Parks and Recreation (NYCDPR). The Golf Course and driving range are bound by the Mosholu Parkway and Major Deegan Expressway to the west and north, Jerome Avenue and the Interborough Rapid Transit (IRT) No. 4 elevated train (the Woodlawn station) to the east, and West Gun Hill Road to the south. The Golf Course and driving range comprise approximately 74 acres of the 1,146-acre park. Existing facilities at the water treatment plant site include a clubhouse, driving range, nine-hole course and a parking lot for approximately 75 cars. The proposed project would be situated under a portion of the 13-acre driving range. During construction the golf course would remain open with a temporary clubhouse, driving range, and parking facilities made available through the Shandler Recreation Area to the north, adjacent to the golf course and driving range. The temporary golf course would be a modification of the existing one, and would still have 9-holes open to the public during the construction period. Following construction, these facilities would be replaced with a new golf course clubhouse, maintenance facility, and new golf course parking lot. The nine-hole golf course would be replaced with an 18-hole "Executive" (short-hole) course with a possible alternative of a nine-hole golf course in the future.

In compliance with the City Environmental Quality Review (CEQR) process as set forth in Executive Order 91 of 1977 and its amendments creating the Rules of Procedure for CEQR, adopted by the City Planning Commission on June 26, 1991 and revised in October 2001 and the State Environmental Quality Review Act (SEQRA) (Section 8-0113, Article 8 of the Environmental Conservation Law) as set forth in 6NYCRR Part 617, establishing the State Environmental Review Process (SERP) as required by the State Revolving Loan Fund Program, a series of studies on development of the proposed project site, Historical Perspectives, Inc. was retained to complete a cultural resources assessment of the Mosholu site.

The purpose of this study is to identify the significant archaeological and historic resources in or around the immediate vicinity of the proposed water treatment facility and to address any potential impacts caused by the proposed installation and associated infrastructure connections. If significant adverse impacts are identified, the study is to also delineate appropriate mitigation measures.

3 METHODOLOGY

Background research for the proposed Croton WTP site was designed to provide a framework for assessing potential cultural resources, and to address two major questions. What is the specific level of potential for precontact and historical archaeological resources of significance to exist in the project site; and, what is the likelihood that such resources have survived historical subsurface disturbances. Sufficient information was gathered to compare, both horizontally and vertically, the precontact past, the historical past, and the subsurface disturbance record. This also served to establish twentieth century construction episodes to aid in the assessment of architectural remains. In order to address potential sensitivity research included a review of primary and secondary sources, cartographic analysis, site files review, informant interviews, and field visits. Each of these tasks is discussed below

3.1 REVIEW OF PRIMARY AND SECONDARY SOURCES

Many local and regional histories were examined for relevant data to help place the site within a historical context. These include works such as Stephen Jenkins' *The Story of the Bronx*, Robert Bolton's *The History of the Several Towns, Manors, and Patents of the County of Westchester*, J. Thomas Scharf's *History of Westchester County, New York, Including Morrisania, Kings Bridge, and West Farms*, and Shonnard and Spooner's *History of Westchester County*, as well as more recent works such as John McNamara's *History in Asphalt*. Plans and descriptions of the Golf Course were obtained at the Olmsted Center maintained by the New York City Department of Parks.

For the precontact period, archaeological literature, such as William Ritchie's *The Archaeology of New York State* provided an overview of the lifeways of the Native inhabitants of New York. In addition, Robert Steven Grumet's *Native American Place Names in New York City*, and Reginald Bolton's *Indian Life of Long Ago in the City of New*

York furnished valuable information on Native American settlements. Furthermore, soil-boring logs were reviewed to establish subsurface conditions.

Cartographic Analysis

In order to determine the original topography and compile a disturbance record for the Mosholu Site, cartographic resources were examined. Information collected included data on the site's possible land-use over time and building history. Historical maps were examined at the Map Division of the New York Public Library and the Westchester County Historical Society.

3.2 SITE FILES REVIEW

Historic resources within the study area that are either listed, or eligible for listing on the National Register of Historic Places were also researched. All available site reports and journal publications relating to archaeological sites were researched for data specific to Van Cortlandt Park and the northern section of the Bronx. Finally, the data files at the New York State Museum (NYSM) and the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP) were examined for information regarding recorded sites in and around the project area.

3.3 FIELD VISIT

A field visit was also conducted during which the current conditions were recorded and site photographs were taken.

3.4 ENVIRONMENTAL SETTING

Three known glacial periods were responsible for the creation of the present topography of the New York City area over the last one million years. Hills or moraines running north-south through the Bronx were formed by the buildup of glacial debris and the irregular erosion of the surrounding valleys and hills were a direct result of the retreating continental glaciers. Geologically, the borough of the Bronx lies within the Hudson Valley Region and is considered to be part of the New England Upland Physiographic Province, which is a northern extension of the Great Appalachian Valley (Schuberth 1968: 10, 74). The substratum is made up of "gneiss and mica schist with heavy, intercalated beds of coarse-grained, dolomitic marble and thinner layers of serpentine" identical to what underlies Manhattan Island (Scharf 1886:6-7).

Water from the melted ice floes was directed along the moraines in the area forming many rivers and creeks, including the nearby Tibbetts Brook, which flows just west of the project site (Figure 1). These watercourses have further eroded limestone belts still exposed between the glacial deposits, creating a varied landscape of hills and valleys. In low-lying areas, lakes and ponds were formed and in the locations with poor drainage, swamps and marshy areas covered the landscape.

Nineteenth and early twentieth-century topographic maps depict the project area as open farmland and woodland with Tibbetts Brook located to the west. The landscape of Van Cortlandt Park prior to 1889 included steep ridges with rock outcroppings, which remained wooded until they were cleared for timber harvests. The low areas of the park adjacent to Tibbetts Brook, flattened through the process of erosion, were most suitable for cultivation. A recent U.S.G.S. topographical map shows the project area as a park and recreation setting on a slight east west slope with elevations between 180 and 190 feet above sea level (Figures 1, 2).

The Mosholu Golf Course occupies 74 acres within Van Cortlandt Park. The present topography of the project site is partially the result of the alteration and shaping of the land in order to create the Golf Course greens in the before 1920 and again in the 1930s. At the southern end of the park there are two locations where low-lying dips collect water during times of intense rain saturation. The section of the course along Jerome Avenue (holes one through six) is level, largely open ground with isolated trees. The terrain slopes downward to the west, where it is more wooded. The course rises again to the north, and holes 12 through 18 are on fairly level terrain with several bedrock outcrops (Olmsted Center nd: 1). There is a wetland area in a bowl located between the third tee and the fourth, eighth, and fifteenth green (Ibid.).

3.5 PRECONTACT OVERVIEW

In order to fully understand the use of the project site through time it is necessary to develop a historical context for the Mosholu Golf Center and Driving Range site specifically. As defined by the National Park Service, "historic contexts provide a framework for the identification, evaluation, designation, and treatment of cultural resources associated with particular themes, areas, and time periods. Historic context-based planning permits recognition of individual properties as parts of larger systems. Historic contexts also help managers and others evaluate properties within their proper levels of significance. As such, they provide both a systematized basis for comparison and a comprehensive frame of reference. In so doing, "historic contexts provide cultural resource managers with a guide for rational decision-making" (Grumet 1990:18). The following discussions establish a contextual framework for both the precontact and historic eras pertinent to the project site.

3.5.1 Precontact Cultural Chronology

Much of the knowledge and understanding of Native Americans in the Hudson Valley area is derived from three sources: ethnographic reports, Native American artifact collections, and archaeological investigations. Archaeologists have devised a cultural chronology for the North American prehistory in which the Precontact era is divided into four main periods, the Paleo-Indian (c. 12,000-10,000 years ago), Archaic (c. 10,000-2,700 years ago), Woodland (c. 2,700-500 years ago), and Contact (500-300 years ago). Settlement types, subsistence, cultural systems and characteristic artifacts changed during each of these stages. In order to present a comprehensive overview of the precontact era and to fully evaluate the potential of recovering precontact cultural remains, each period will be reviewed with regard to 1) the environment during the time period, 2) the characteristics illustrative of the phase, and 3) any

recovered archaeological sites within the region. This examination was completed in order to assess the potential that indigenous groups would have had for exploiting the project locale in general as well as the actual project site.

Precontact sites are characterized by their proximity to a water source, fresh game, and exploitable natural resources (i.e., plants, raw materials for stone tools, clay veins, etc.). These sites are often divided into three types, primary (campsites or villages), secondary (food processing, tool manufacturing), and isolated finds (a single recovery of artifacts either lost or discarded). The examination of primary habitation sites indicates that they are often situated in locales that are surrounded by a number of exploitable resources. In addition, these sites are located in areas easily defended against both nature (weather) and enemies. Secondary sites are often found at the location of an exploitable resource (e.g., lithic quarry site).

3.5.2 Paleo-Indian Period

The earliest period of human occupation, the Paleo-Indian Period, is characterized by the presence of small bands of large- game hunters scattered over large areas of territory. Following the big-game animals that made up the major portion of their diet (e.g., mastodon, bison, caribou), these nomadic hunters moved seasonally across the landscape. Originally, these bands crossed the narrow land bridge from the Old World to the New, and although the population was small in number, they eventually spread over the wide expanse of territory now known as North America.

During the early Paleo-Indian Period the northeastern area of North America was evolving into a more favorable deciduous forest environment. Paleo-Indian sites have been recovered in well- elevated fertile areas situated close to a water source, which is typical of most precontact sites in all-subsequent phases. The remains of big-game animals have been recorded in large numbers on the west side of the river in Orange County (Ritchie 1994: 10-11). While this verifies that the locale surrounding the project area may have provided a food source for the Paleo-Indian hunters, no "kill sites" have been recovered. The fact that these sites have not been found may be the result of the flooding of coastal sites as the glaciers continued their retreat, or may be due to the estimated small site size during the early Paleo-Indian period.

With the exception of stone tools, artifactual material from this early period, has not survived well in the archaeological record. Extensive research indicates that the diagnostic artifact of the nomadic Paleo-Indian hunters was the fluted point. By the late Paleo-Indian Period, however, small leaf shaped or bifacial knives, scrapers, and borers had become part of the hunter's tool kit. As the climate became warmer, the environment in the Northeast became more advantageous to precontact peoples. In addition, small game animals more suited to the temperate environment replaced the larger fauna that were rapidly becoming extinct.

Following the final retreat of glacial ice, the area now known as the Bronx flourished with plants suited to arctic and tundra conditions. Eventually, the locale became a forest composed of deciduous trees and conifers. The fluctuating floral and faunal communities

eventually stabilized over the last 12,000 years, resulting in an environment often characterized as a climax forest, comprised of oak, hemlock, beech and chestnut trees.

While no Paleo-Indian sites have been recovered in this section of the Bronx, there are reports of sporadic finds of fluted points in the Croton Point area to the north in Westchester County (Crichton 1986). A number of archaeological investigations in Westchester County during the mid-1980s noted a distinct level of Paleo-Indian occupation (Crichton 1986). To the south, a small campsite, Port Mobil), was recovered in Staten Island (Ritchie 1994: 1, 3, 7).

3.5.3 Archaic Period

Data regarding the Archaic period indicates that the quantity of recorded archaeological sites is much larger then those dating to the Paleo-Indian Period, thus suggesting a significant increase in the population of native peoples. The Archaic period is also characterized by an overall shift in the environment, an expansion of the lithic tool kit, and the exploitation of defined territorial boundaries.

By the Early Archaic the environment in the Northeast had developed into a deciduous woodland forest. A gradual warming trend allowed new resources to establish themselves in the river valley. The Archaic peoples subsistence was "based on hunting, fishing and gathering of wild vegetables" (Ritchie 1994:31). They hunted smaller game animals (deer, rabbit, beaver, and wild turkey) and gathered a variety of wild plants, as well as exploited the marine environment (fish and shellfish gathering). Artifacts attesting to the expanded subsistence economy include fishing implements, and the mortar and pestle.

During the Period, the expanding exploitable resource base may have initiated the significant increase in population. The Archaic hunters also began exploiting a well-defined territory, often reoccupying favored sites. Because of the repeated occupation of these Archaic sites as well as the seasonal rounds made within specific territories, archaeologists have been able to recognize several identifiable cultural traditions in New York State (Ritchie 1994). The change in the number of sites recovered also indicates that Archaic peoples had a greater impact upon the landscape. Typical with all precontact sites, river valleys and coastal areas were the preferred locale for primary campsites. This environment supported the game, plants, and marine resources desired by Archaic peoples.

Additions to the tool kit of the Archaic hunter include the narrow bladed projectile point, grooved axe, and beveled adz. Archaeologist Robert Funk has suggested that the Laurentian, Susquehanna, and small-stemmed cultural traditions persisted in the Hudson River Valley during the Archaic period (Funk 1976: 250). In his reassessment of the distribution of Late Archaic (or Transitional Archaic 4,000-3,000 years B.P.) projectile points, Snow alternatively suggests that the Susquehanna tradition, represented by the Snook Hill, Perkiomen and Susquehanna Broad points, was dominant in the first half of the period and the Orient Complex in the latter (Snow 1980: 237). In the Hudson River Valley, where a number of Archaic sites have been investigated, Orient Points have been radiocarbon-dated to approximately 4,000 to 2,800 years B. P. To date, however, the exact sequence of cultural

traditions and representative complexes for the Archaic period is still undefined and a constant source of debate.

The Native American population had increased significantly in the Hudson River Valley region by the Late Archaic period. The variety of recovered sites from this period include rockshelters, open woodland camps, and secondary processing locations overlooking the various water sources. In a section of the Bronx's Riverdale Park, excavations were conducted on a series of precontact sites (DeCarlo 1990: 5). Archaeologists recovered a Late Archaic assemblage of oyster shells, fire cracked rocks, scrapers, bifaces, lithic debitage and diagnostic projectile points suggesting that this location may have been used for hunting and shellfish procurement from the Hudson River (Lenik 1992: 24).

3.5.4 Woodland Period

The Woodland Period is characterized by the introduction of pottery and horticulture, the appearance of large semi- permanent or permanent villages, and the establishment of clearly defined trade networks which marked the transition to a more settled culture. As with the earlier precontact periods, archaeological evidence suggests a marked preference for large-scale primary habitation sites within the vicinity of a fresh water source (e.g., rivers, lakes, streams, and ponds). In the majority of cases, secondary sites, where specific activities occurred (e.g., shellfish collecting and/or processing, butchering, and stone tool-making), were situated near the location of the exploited resource.

The first appearance of pottery was during the Early Woodland in New York State (c. 1000 B.C.) when crude, undecorated pottery, called Vinette 1, was first produced. This type of pottery has been recovered from sites on major waterways and tributaries. As the Woodland period progressed, regional variations in ceramic styles became common. Other innovations during the Woodland period reflect different cultural styles that archaeologists have been able to identify with specific native groups. A few of these include the introduction of the bow and arrow, pipe-smoking, and mortuary ceremonialism.

During the Woodland Period, fish and shellfish continued to provide a stable and reliable resource. In the smaller tributary rivers fish weirs were used for the recovery of large quantities of anadramous fish (Brumbach 1986:35). The introduction of horticulture in the New York area also signaled the advent of larger and more permanent settlements. Large tracts of land were cleared in locations nearby the primary settlements. Some of the native villages settled during this period were fortified and situated on "high ground." By the Late Woodland Period, Native paths were established connecting permanent villages, creating a trail to exploitable resources, and providing a link for the distribution of trade goods.

3.5.5 Known Precontact Sites in the Vicinity

Precontact archaeological sites have been recovered throughout the northwestern region of the Bronx. Primary sites (villages), secondary sites (tool manufacturing, food processing), and isolated finds (single items or features) have been investigated in the area surrounding Van Cortlandt Park. Some of the precontact sites identified within roughly two miles of the

present project location include several shell middens and precontact quartz processing sites (Beauchamp 1900:10; Lenik and Gibbs 1994: 55).

Several precontact sites have been identified within the confines of Van Cortlandt Park. A map depicting Native American sites in the Bronx indicates that the village called Keskeskick was at one time located in Van Cortlandt Park (Figure 3; Bolton 1972: 136; Anderson 1991: 4). Historical deeds from the seventeenth century also describe this village when it was sold to the early Dutch settlers of the Bronx (Grumet 1981: 19). Reginald Bolton's research further indicates that this "extensive and probably permanent village" was located close to the Van Cortlandt mansion, to the west of Van Cortlandt Lake and to the southwest of the present project site. The examination of documents also indicates that the area surrounding the mansion was where some of the village inhabitants had large planting fields (Grumet 1981: 15). Grumet's research also identified that another "Indian field" was located on the eastern side of the park, north of the current project site.

A native trail, identified by Reginald Bolton and confirmed by Robert Grumet's research, extended south from Westchester County along the western boundary of Van Cortlandt Park (Figure 3). This trail, which traveled roughly north-south along what is now Broadway (Old Post Road), curved eastward into the park near its southwest corner before turning south again following the path of the present day Deegan Expressway (Bolton 1972: 136; Grumet 1981: 69). The trail likely gave access to the many primary and secondary sites located throughout the park.

The earliest archaeological exploration within Van Cortlandt Park was conducted in 1890 by J. B. James, who recovered pottery, fire pits, lithic material, burials, and other traces of the long-term occupation of this locale (Anderson 1991: 4; Bolton 1972: 141; Storch Associates 1986: 36). Additional material has been recovered from sites all over the park including storage pits, pottery fragments, shell middens, burials, and lithic material (Bolton 1934: 141; Tieck 1968: 3; Skinner 1915: 55).

More recent investigations within Van Cortlandt Park (NYSM #2387, #2823, #4057, and #7727) have identified a camp, village, shell midden, and campsite in locales throughout the park. During the early 1990s several archaeological investigations were conducted within the park. Bankoff and Winter (1991) recovered a storage pit containing shell, ash, and lithic material. The archaeological examination of the Chapel Farm site (A005-01-00079, NYSM #7729) identified a precontact lithic workshop nearby in Riverdale (Kearns and Kirkorian 1991). Arthur C. Parker describes the two sites closest to the current project area NYSM #7727, within Van Cortlandt Park, and NYSM #2837, east of the park and the Major Deegan Expressway, as precontact campsites.

3.5.6 Precontact Archaeological Potential

Documentary research found that the project site is in an area of high sensitivity for precontact resources. The site file search and assessment of sensitivity conducted at the New York State Museum (NYSM) and the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) reported eight known precontact sites within a two-mile

radius of the proposed facility. The well-documented presence of a nearby native pathway and the permanent village of Keskeskick within the park indicates that the village site may have been extensive and/or occupied over a long period of time. The physiographic characteristics of the park, together with the information extracted from the documentary record and the number of precontact sites explored archaeologically suggests that Native American peoples may have exploited the proposed project site.

The project area was used as farmland and later parkland during the nineteenth and twentieth centuries. Topographic maps that predate the creation of the Golf Course do not provide adequate details necessary to determine the changes that were effected by the construction of the Golf Course. The New York City Department of Parks archives at the Olmsted Center only maintain topographic maps generated after the Golf Course was already in place (1936, 1982). These maps document minimal changes to the landscape after the Golf Course existed. A review of topographic maps dating from 1874, 1891, 1911, 1936, and 1982 provide little detail on the topographic changes that the project site experienced with the creation of the Golf Course, which would have been when the most extensive landscape changes were made (Viele 1874; U.S.G.S. 1891, Figure 6, 1911; City of New York Department of Parks 1936, 1982). However, they do show subtle changes to the landscape that took place between 1936 and 1982. For example, tees have been filled to raise elevations, and holes have – in some cases – been lowered.

Twentieth century topographic maps document the locations of existing buried irrigation lines, which would have disturbed discrete portions of the landscape (City of New York Department of Parks 1982). A comparison of a 1959 irrigation plan and the 1982 topographic map of the Golf Course documents the fact that the locations of irrigation pipes have changed over that 30 year period (City of New York Department of Parks 1959, 1982). Much of the proposed Water Treatment Plant project site has been disturbed by the installation of these pipes, although disturbance is limited to about a one-foot wide trench where the pipes were laid (Figure 7).

The Geotechnical Report for the project site documents generalized and more specific existing subsurface conditions (City of New York DEP et al 2000, Vol. 1). The report describes the surficial soils as lying between 0-34 feet, and generally composed of silty sand with sandy silt, boulders, and some organic matter (Ibid.:3). Beneath this, glacial soils have a medium dense to dense well-graded silty sand with gravel, cobbles and boulders. In some locations the report states that "imported fill or reworked till may overlay the till" (Ibid). Pockets of dense saprolite (which is soft, partially decomposed rock rich in clay and remaining in its original place) as thick as 10 feet are noted above some sections of bedrock, and underlying bedrock depth varies between 4 to 40 feet, averaging about 15 feet.

A total of 51 soil borings were performed in the project site (Figure 8). Most contained about three inches of topsoil, and between two and four feet of silty sand with organic matter (Appendix A). While the presence of organic matter in this uppermost soil zone may indicate some degree of disturbance (perhaps caused by the uprooting of trees or by other such actions), it is not a guarantee of it (Eric Acs, Geologist, Metcalf & Eddy, personal communication, April 27, 2004). Beneath the upper level is a sub-stratum that is typically

comprised of brown silty fine sand with sand and silt (Boring MG-B32-99). In some locations this strata contains gravel, cobbles, and boulders (MG-B40-99). Nothing in the boring logs definitely indicates that levels above the glacial till have been disturbed, despite the statement to this effect in the Geotechnical Report (City of New York DEP et al 2000 Vol. 1: 3). In contrast, the borings do not portray, with any degree of accuracy, disturbed strata. The geologists did note several mounds at the site, which soil borings indicated were not natural (Eric Acs, personal communication; see Boring MG-B30-99). It is quite possible that these mounds were constructed as part of the original Golf Course

The areas of known disturbance, such as the location of the clubhouse, the parking lot that has been graded, the locations of utility lines, and the routes of the irrigation pipes, have not retained potential archaeological sensitivity. Furthermore, large portions of the project site have - in all likelihood – experienced topographic changes and landscaping with the original creation of the Golf Course. However, no documentation on the original Golf Course's construction was available. Therefore, in light of the fact that extensive disturbance could not be documented for much of the project site, it is assumed that there may be areas that have the potential to contain precontact deposits.

3.6 CONTACT PERIOD

Documentary and archaeological sources have provided much of what is known about the Contact Period. Archaeologists and historians have carefully examined historic documents in order to understand the native cultures that were living along the Hudson River when Europeans first arrived. Legal documents and ethnohistorical accounts and have provided valuable details about the past lifeways of native peoples. Because information about the settlements, appearance, and behavior of ancient peoples cannot be reconstructed from the recovery of a few artifacts, these additional resources have provided the means by which archaeologists can assemble more complete data about past cultures.

When the first Europeans arrived it was noted that Native American groups living along the shores of the Hudson River had developed complex group dynamics. The first contact between Europeans and Native Americans occurred when Henry Hudson docked his vessel near the present day Yonkers, just north of the project site in Westchester County. Initial trade between the two cultures began along the Hudson River before moving inland. Furs and wampum were used as a medium of exchange for European goods. In 1625, Johannes de Laet, one of the early travelers to the area wrote that the natives he encountered were "divided into many nations and languages" (Bolton 1972: 16). Descriptions like this were often repeated by many. While initial contact was primarily peaceful, large-scale conflicts erupted following the arrival of Governor Willem Kieft in 1638. Kieft was notorious for his harsh policies against the local tribes. By the mid- to late seventeenth century, many of these peoples were subsequently decimated by local hostilities and European-introduced diseases.

Historic documents indicate that when the first Europeans arrived there were a large number of native peoples occupying the locale along the Hudson River in the northwest Bronx. Early historical records (deeds, treaties, and maps) identify the indigenous people that inhabited

this section of New York City. One early document, the Hendricks Map of 1616, depicted a group called the Wikagyl, subsequently identified as the Wiechquaesgeek, as the inhabitants of the northern Bronx and lower Westchester County (Bolton 1934: 128; Grumet 1981: 59-60). The Wiechquaesgeek were able to exploit the rich environment of the northwest Bronx between the Hudson and Bronx Rivers, including the area just north of the site identified as the "Indian Field" (Figure 3). The area provided an optimal locale for deer, raccoon, fox, rabbit, and waterfowl. Historic documents indicate that many of the surviving native peoples eventually sold their land or moved to the north (Grumet 1981: 60-62; Ruttenber 1982).

3.7 HISTORICAL OVERVIEW

3.7.1 Historical Chronology

3.7.1.1 Colonial Period

The initial European settlement of the New York City area was marked by misunderstandings and hostilities between the native groups and the Dutch colonists. Following a short but bloody "war," which ended in 1645, Adriaen van der Donck purchased 24,000 acres of land from the Wiechquaesgeek Indians along the Hudson River. This large tract of land, granted to him by the Dutch prior to his purchasing it from the sachem Tacharew, encompassed what is now Van Cortlandt Park (Anderson 1991: 12; Pons 1994: 2). Much like the earlier Dutch Settlers, van der Donck took advantage of the areas already cleared by the Native Wiechquaesgeek and established a farm that included large corn fields in the locale of what is now the Van Cortlandt Mansion. Van der Donck maintained a good relationship with the native inhabitants until his death in 1655. Over ten years later, his widow and her second husband sold a large portion of land (most of the south half of present day Van Cortlandt Park) to her brother, Elias Doughty, who in turn sold the land to William Betts and his son-in-law George Tippett in 1668. The water source in the center of the property eventually became known as Tibbett's Brook, an alteration of the Tippet family name.

In 1670, the property was again sold to Frederick Philipse, who had amassed a large estate extending from the north Bronx up through much of Westchester County. Large sections of the Manor of Philipsburgh, located in what was then Westchester County, were leased to tenants. Jacobus Van Cortlandt purchased fifty acres of land from his father-in-law Frederick Philipse in 1699. The property then became known as Van Cortlandt Manor. Eventually, Tibbetts Brook, located to the west of the present project site, was dammed to create present day Van Cortlandt Lake. It was there that in c. 1700 Stephanus Van Cortlandt constructed a sawmill. A large manor house, which is still standing, was built near the lake in 1748 by Frederick Van Cortlandt (Jenkins 1911: 352). Nearby, the family vault was constructed on what has become known as "Vault Hill." Both the mansion and the vault are located in the southwestern portion of the park, removed from the present project site.

3.7.1.2 Revolutionary War

During the American Revolution, Van Cortlandt Manor became the center of action on several occasions. In fact, Agustus Van Cortlandt hid the municipal records of the City of New York inside the family vault in 1776. In an effort to recapture Fort Independence, American soldiers marched south from Yonkers to the high ground above the Van Cortlandt house on January 18, 1777. Although this attempt failed, George Washington used the main house for his headquarters and ordered his troops to cut down much of the forage in the fields surrounding the manor in order to prevent surprise attacks by British soldiers.

A major battle took place within the confines of the park during the following year. A small group of American soldiers accompanied by several Stockbridge Indians sympathetic to the American cause attacked a battalion of British troops on August 20, 1778. After forcing a retreat, they were ambushed by British, Tory and Hessian troops. The small band was driven across Van Cortlandt's woods to what is now the eastern portion of the park. Thirty-seven of the Indians, including their leader Ninham, were slaughtered near what was thereafter called Indian Field (Jenkins 1912: 162-164; Storch Associates 1986: 44). The site of the ambush is said to be near the corner of East 233rd Street and Van Cortlandt Park East (Pons 1994: 13). The remains of these peoples were buried a few days later near the site of the ambush, north and clearly outside of the present project site.

3.7.1.3 Nineteenth Century

The review of nineteenth century maps indicates that much of the northwestern area of the Bronx was still being used as farmland and woodland. The population of New York City was rising steadily during the early part of the century. Water resources and transportation networks became priorities for city officials. In order to provide an ample supply of water to the populace, resources in Westchester County were explored. It was determined that the Croton River would be able to provide enough water via an aqueduct to insure an abundant water supply. Acting on this notion, the Croton Aqueduct Commission was established in 1833. Over the next nine years, construction plans were established and the aqueduct was completed in 1842. In order to build the aqueduct a large tract of land was cleared along its route. Now known as the "Old" Croton Aqueduct, it ran north-south paralleling the Hudson River. A portion of this aqueduct runs through Van Cortlandt Park and is east of Tibbetts Brook, and well west of the Mosholu WTP project site.

By the second half of the 19th century, the Van Cortlandt Park area contained large estates and farmland, including the Augustus Van Cortlandt and John Dickinson Estates. It was at this time that these estates began to be subdivided into smaller building lots. By 1851 a house appeared to have been built off of what is now West Gun Hill Road, at the southwestern corner of the project site (Sydney and Neff 1851). At that time the house was owned by A. Berrian. The structure was still standing in 1853, although no ownership association was provided (Dripps 1853).

By 1868 much of the former Van Cortlandt property was divided into smaller parcels and most of the project site was vacant and owned by the Estate of J. Trier. Land to the west of the project site was divided between two owners, G. and J. Dickinson. Land within the project site also belonged to J. Williams, E. Johnson, and H.W. Law. R. W. Dickinson

owned the only dwelling within the project site that was identified at the southwestern corner of the project, but otherwise the remainder of the site was vacant (Beers 1868; Figure 4).

A comparison of the 1868 land owners (Figure 4) to the 1870 Census listings for the tracts along what is now West Gun Hill Road demonstrates that the R. W. Dickinson house (which is the only one that falls within the project site) was not owner-occupied at that time. The following table details land ownership and occupancy:

Lot Owners (1868 Beers Atlas)	Occupants (1870 Census)
J. Dickinson	John Dickinson (56) farmer (and family) 2 laborers 2 servants
R.W. Dickinson **(in project site)	George Sacklar (38) farmer (and family) John Sacklar (40) farmer (and family)
E. Johnson	E.A. Johnson (56) professor (and family) 2 servants
H.W. Law	Henry Law (45) Book Keeper (and family) 1 boarder

Both John Dickinson (not within the project site) and his neighbors George and John Sacklar (within the project site) are listed in the 1870 census as farmers. It may be that the Sacklars were tenant farmers working for the Dickinsons, as they were living in the house owned by R.W. Dickinson. The Dickinsons held large tracts of land in the immediate vicinity (Beers 1868; Figure 4; Bromley 1882).

The 1874 Viele topographic map shows that much of the land was a cleared meadow during the late nineteenth century (Figure 5), suggesting it may have served as farm land. Two structures are shown just south of the proposed project site boundaries, and the Berrian/Dickinson house still appears either within or directly adjacent to the project site (Viele 1874). The house was razed sometime between 1882 and 1893 (Bromley 1882, 1893). A search of census records and county directories could not establish occupancy of the dwelling, other than the Sacklars in 1870 (U.S. Census 1860, 1870, 1880; Gopsill 1866; Curtin 1868; Shaw 1878).

3.7.1.4 Croton Aqueduct

The intense demand for water in New York City had exceeded the potential of the Old Croton Aqueduct by 1875 and plans were once again formulated to build a second, larger, aqueduct from Croton to New York City. The segment of the New Croton Aqueduct that flows through Van Cortlandt Park is a masonry brick-lined tunnel found at an average depth of 125 feet. This new conduit that runs partially beneath the project site was completed in 1891. An 1891 Atlas of the Hudson River Valley depicts the Old and New Croton Aqueducts as well as the boundaries of the newly formed Van Cortlandt Park. The only buildings shown are the historic Van Cortlandt mansion and surrounding structures, which are well removed from the Croton WTP site.

3.7.1.5 Railroads

A third construction project that affected the terrain of Van Cortlandt Park was the introduction of the New York City and Northern Railroad Line in 1872. The line, completed in 1880, provided a link between New York and Boston. The route of the railroad, with its many bridges, passed directly through the eastern portion of the park, parallel to Tibbetts

Brook, and altered the drainage patterns within the park, creating a series of marshy areas. Passenger service on this railroad, by then called the Putnam Line, ceased by 1958.

3.7.1.6 Van Cortlandt Park Development

The last Van Cortlandt moved out of the mansion house in 1888. One year later, a large section of land, including the former Van Cortlandt Manor and the parcels encompassing the present project site, was acquired for public parkland in the northwestern section of the Bronx. At the time of acquisition, half of the acreage within the park was meadowland and the other half woodland. Only approximately 40 acres was identified as vegetable gardens. That same year the mill, located within the park, ceased operation and the Parade Ground near the mansion house was opened to the public.

During the late nineteenth and twentieth centuries most of the physical changes made to the park were near the locale of the Van Cortlandt house and lake. The southern and central areas of the park were used for picnics, outdoor games, and the 1895 creation of the first municipal Golf Course, the 55-acre Van Cortlandt Links Golf Course (Storch Associates 1986: 73). As the popularity of the sport increased, the original nine-hole course was replaced by a larger 18-hole course in 1899 (Ibid). By that date the Van Cortlandt Links covered 120 acres. Increased congestion encouraged the New York Golf Club, which had 300-400 members patronizing the Links, to propose the construction of a second golf course near the foot of Gun Hill Road (Ibid: 74). Although this new building was not constructed, the idea of utilizing the area near Gun Hill Road persisted.

3.7.1.7 Mosholu Golf Course

In 1904, a new "advanced" golf course was laid out in Van Cortlandt Park to alleviate overcrowding on the Van Cortlandt Links course (Storch Associates 1986: 75). This course may have been constructed in the location of the present Mosholu course, but this is not confirmed (Ibid.). Only two years after the advanced course was established, a new permanent golf course was proposed for the project site location. However, it was not until 1914 that the Mosholu Links was built on the project site (Ibid). The original course had "parallel fairways separated by single tree rows" (Ibid.:91). Currently, the Mosholu Golf Course occupies 66 acres in the southeasterly corner of Van Cortlandt Park.

In April 1928 plans were drawn up for the creation of a clubhouse at Mosholu Golf Course. The *Plans for Golf House and Comfort Station at Mosholu Links,* designed by John R. Brinley, a relatively unknown architect, show that the clubhouse was built with a partial basement, and was hooked up to public sewer lines. Shortly thereafter, the Golf Course was redesigned. The layout of the course that exists today was created in the mid 1930's during a rebuilding of the course (Olmsted Center nd: 1; City of New York Department of Parks 1936). A 1942 Plan for New Planting and General Park Rehabilitation prepared by the U.S. Works Progress Administration (WPA) indicated that the Golf Course was to undergo selective forestry, the restoration of shrub areas, and lawn renovation (Olmsted Center 1942). However, details of the locations of these activities were not provided. Pathways around the clubhouse were graded and gutters were installed along their edges (Ibid.). The parking lot

was resurfaced, which included regrading the area north of the clubhouse to the road. No depth of grading was recorded.

In 1971 the clubhouse was extensively altered, with Daniel Chait serving as architect. At that time the building's piers and footings were reinforced, and substantial structural additions were made to three sides - the east, west, and front (Olmsted Center 1971; Photographs A-C). These additions were built with a sub grade slab foundation, over a 6" layer of well-compacted porous fill placed over soil.

Throughout the twentieth century, a number of major roadways were built beginning in 1931 with the Grand Concourse Extension, later called the Mosholu Parkway Extension. This parkway constitutes the western boundary of the Croton WTP site. This was followed by the Henry Hudson Parkway in 1935 and the Major Deegan Expressway in 1948.

3.7.2 Known Historical Sites in the Vicinity

Although no archaeological work has been undertaken within the Croton WTP site, nearby excavations have been conducted by both avocational and professional archaeologists on sites that have been dated to the historical period. In 1910, workmen excavating for a new sewer near the Van Cortlandt Manor Mansion uncovered a foundation for what may have been Van der Donck's house. The subsequent excavation revealed a large amount of domestic debris dating to the seventeenth century. Archaeological excavations in other areas surrounding the Manor house have also been conducted.

The historic Van Cortlandt Mansion, now a museum, and Vault Hill are in the southwestern section of the park and therefore well outside of the proposed Croton WTP site. When this area was part of Philipsburgh Manor and Van Cortlandt Manor, large portions of these estates, including the park property, were likely leased to tenant farmers. Small farmhouses with their associated outbuildings and cultivated fields were likely present up until the Revolutionary War. Some of these dwellings may have been situated in the northeastern section of the park in the location of the former native planting grounds. The woodland in the northern area of the park would have provided timber and possibly small game for the inhabitants of the Manor.

The Mosholu Golf Course is an important feature within Van Cortlandt Park. While no landmarked buildings are located on the site, the Mosholu Golf Course Clubhouse is present. Although not eligible for listing on the National Register as an individual structure, this building is of historical interest. The structure is reminiscent, on a small scale, of the grand clubhouses erected at private suburban golf courses. The building is a Colonial Revival structure built of brick with a wood trim. The most notable features of the building are the entrance portico, with its eight Roman Doric columns, and the gables, which are pierced by Palladian windows – but these architectural elements were not original, but were added to the structure in 1971.

The main body of the Mosholu Golf Course in Van Cortlandt Park (1888) is located to the west of Jerome Avenue. On the east side of Jerome Avenue, is Woodlawn Cemetery. This historic cemetery has numerous extravagant mausoleums, memorials, and tombstones; several affluent citizens of New York are interred here. Woodlawn is also noted for its elaborately-groomed grounds and manicured lawns. Jerome Avenue, which was a regulated road at the time the nearby Woodlawn Cemetery was established, serves as a buffer, physically separating the cemetery and the Golf Course.

3.7.3 Historical Archaeological Sensitivity

In 1868 the Berrian/Dickinson house stood within the southern edge of the project site. The dwelling was built prior to 1851 and was razed between 1882 and 1893. While remnants of the building's foundation may still remain, it is possible that landscaping within the park has disturbed its location. More likely, shaft features associated with the structure (e.g., wells, cisterns, and privies) remain undisturbed somewhere near the dwelling's location. These shaft features frequently contain artifactual material related to the occupants of the dwelling. Therefore, the southwestern portion of the project site has the potential for subsurface shaft features associated with the Berrian/Dickinson structure that was occupied by the two Sacklar families in 1870 (Figure 9).

4 EXISTING CONDITIONS

The site of the proposed Croton WTP is situated east of the NCA (1884-1890) in the Mosholu Golf Course at Van Cortlandt Park. The parcel is located between Jerome Avenue and the Mosholu Parkway.

4.1 ARCHAEOLOGICAL RESOURCES

Precontact Archaeological Resources. Documentary research found that the project site is in an area of high sensitivity for precontact resources. The site file search and assessment of sensitivity conducted at the NYSM and the NYSOPRHP reported eight known precontact sites within a two-mile radius of the proposed facility. The well-documented presence of a nearby native pathway and the permanent village of Keskeskick within the park indicates that the village site may have been extensive and/or occupied over a long period of time. The physiographic characteristics of the park, together with the information extracted from the documentary record and the number of precontact sites explored archaeologically suggests that Native American peoples also likely exploited the proposed project site.

The project area was used as farmland and later parkland during the nineteenth and twentieth centuries. Therefore, much of this locale was not altered by widespread development, but instead was altered by landscaping. Specific locations have experienced subsurface impacts with the construction of the clubhouse, grading for the parking area, and the installation of utilities and irrigation lines. Outside of the areas of documented disturbance, the project site may be sensitive for precontact resources (Figure 9).

4.2 HISTORICAL RESOURCES.

A dwelling belonging to A. Berrian in 1851 and R.W. Dickinson in 1868 (Sidney and Neff 1851; Dripps 1853; Beers 1868, Figure 4) stood at the southeastern corner of the project site. The dwelling was razed sometime between 1882 and 1893 (Bromley 1882, 1893). The dwelling was occupied by two related families in 1870, probably renters, who were farmers. Although the location of the dwelling may have been disturbed, in part, by landscaping for the Golf Course, shaft features associated with the dwelling may have remained undisturbed. Therefore, the southwestern section of the project site is potentially sensitive for subsurface shaft features associated with the dwelling (Figure 9).

According to the current design plan, the proposed Croton WTP would be located to the east of the NCA and the Mosholu Parkway. The documented aqueduct is a functioning component of the city's water supply system.

Existing facilities at the site include a clubhouse, maintenance facility, driving range, nine-hole golf course, and a parking lot for approximately 75 cars. These facilities would be replaced on a temporary basis during construction and on a permanent basis after construction.

The proposed Croton WTP site is also visually and physically separated from the known historic structures in the Park, such as the Van Cortlandt Mansion, which is located approximately 3/4 mile to the west. Although Van Cortlandt Park itself is historically important, no formal process has been undertaken to definitively establish landmark status. However, a detailed account of the park's history, structures, and existing conditions in 1986 was prepared by Storch Associates, Westbury, New York, and is on file with the New York City Landmarks Preservation Commission (LPC).

The Olmsted Center archives (New York City Department of Parks, Map Division) retains records of some of the alterations made to the Mosholu Golf Course and the Clubhouse structure. This includes the original architectural drawings of the Clubhouse, which was designed was built in 1928. Plans from the Olmsted Center also indicate that in 1971 major structural additions were made to three of the facades, including the front elevation (Photographs A-C). Due to the lack of integrity, the structure is probably not eligible for listing on the National Register of Historic Places. The additional data collected for this report argues against the need to photo-document the clubhouse, but the review agency has that option. However, it would be very difficult to capture any of the remaining look and feel of the 1920s clubhouse due to the substantial 1971 enhancements to the front and sides of the building.

5 POTENTIAL IMPACTS

5.1 ARCHAEOLOGICAL RESOURCES

The proposed construction of the Water Treatment Plant may potentially impact precontact archaeological deposits.

Temporary construction parking, hauling roads, and staging areas that are outside of the footprint of the Croton WTP may have a potential to impact both precontact and historical archaeologically sensitive areas.

5.2 HISTORICAL RESOURCES

During the years that construction is underway, there would be a temporary loss of the golf facility at the Mosholu Golf Course (ca. 1914). The Mosholu Golf Course Clubhouse would also be demolished and replaced. This structure is probably not eligible for listing on the National Register due to extensive modifications in the 1970s.

Construction would take place above a National Register-eligible feature, the NCA . The Aqueduct is still in active use and a connection to and rehabilitation of a portion of the Aqueduct would be necessary. The rehabilitation of the Aqueduct would be considered an impact.

Construction for the proposed Croton WTP would be visually and physically separated from the other historic and/or landmarked structures within the park or the surrounding area (e.g., Van Cortlandt Mansion, Vault Hill, Woodlawn Cemetery). Therefore, no significant construction related impacts to existing historic structures are anticipated.

All temporary construction parking, hauling roads, and staging areas would have only a temporary visual impact on the existing parkland.

6 CONCLUSIONS AND RECOMMENDATIONS

The Phase 1A research, which included documentary analysis, cartographic research, informant interviews, site file searches, and a walkover survey, concluded that the project site might have the potential for the presence of precontact cultural material. Furthermore, one possible historical dwelling was noted in the southwest corner of the project site on historic maps. The Mosholu site has the potential to contain archaeological resources associated with this dwelling.

Although there has been ground disturbance and a continuously evolving recreational landscape, there is still a potential precontact and historical archaeological resources to have remained undisturbed. Consequently, if the Mosholu Site were selected for the WTP, a Phase 1B investigation would be conducted by a pre-qualified specialist in accordance with the New York Archaeological Council's *Standards* (1994) to verify the presence or absence of archaeological deposits. A protocol for the Phase 1B field investigation would be prepared under separate cover, and would be submitted to SHPO. The Phase 1B field investigation would occur prior to any construction-related excavation on the site. These

investigations and the subsequent mitigation of any findings would avoid any significant adverse impacts to archaeological resources.

6.1 CONCLUSIONS

6.1.1 Archaeological Resources

Documentary research found that the project site is in an area of high sensitivity for precontact resources. The site file search and assessment of sensitivity conducted at the NYSM and the NYSOPRHP reported eight known precontact sites within a two-mile radius of the proposed facility. The physiographic characteristics of the park, together with the information extracted from the documentary record and the number of precontact sites explored archaeologically suggests that Native American peoples also likely exploited the proposed project site.

The project area was used as farmland and later parkland during the nineteenth and twentieth centuries. Therefore, much of this locale may not have been altered by widespread development. The introduction of the two aqueducts, railroad tracks with associated bridges, and paved roads and/or paths have transformed many areas within the park. More recently, the introduction of the initial 1904 "advanced" course and the 1914 Mosholu Golf Course, with the associated extensive land manipulation, changed the physical appearance of the project site considerably. The installation and relocation of irrigation pipes further disturbed the landscape. Regardless, outside of the areas of documented disturbance, the project site may be sensitive for precontact resources (Figure 9).

6.1.2 Historical Resources:

Documentary research also indicates that there was at least one historical structure in the project site in the second half of the 19th century and therefore, the project site has the potential to yield historical archaeological resources. A dwelling was built at the southwestern corner of the project site sometime prior to 1851 and was razed between 1882 and 1893. Potential shaft features associated with the dwelling may lie within the project site (Figure 9).

According to the current design plan, the proposed WTP would be located to the east of the New Croton Aqueduct, which is a functioning component of the city's water supply system. Construction would entail connections with the buried New Croton Aqueduct, a National Register eligible structure. The Aqueduct is still in active use and rehabilitation of a portion of it would be necessary. The rehabilitation of the Aqueduct would be considered an impact.

The proposed WTP site is also visually and physically separated from any known historic structures in the Park, such as the Van Cortlandt Mansion, which is located approximately 3/4 mile to the west. Although Van Cortlandt Park itself is historically important, no formal process has been undertaken to definitively determine its eligibility for landmark status. However, a detailed account of the park's history, structures, and existing conditions in 1986

was prepared by Storch Associates, Westbury, New York, and is on file with the New York City Landmarks Preservation Commission (LPC).

The project will entail removing and rebuilding the Mosholu Golf Course Clubhouse that dates to 1928. However, this building does not appear to be eligible for listing on the NR due to extensive modifications in the 1970s.

6.2 RECOMMENDATIONS

6.2.1 Archaeological Resources

Although there has been ground disturbance and a continuously evolving recreational landscape, there is still a potential precontact and historical archaeological resources to have remained undisturbed. Consequently, if the Mosholu Site were selected for the WTP, a Phase 1B investigation would be conducted by a pre-qualified specialist in accordance with the New York Archaeological Council's *Standards* (1994) to verify the presence or absence of archaeological deposits. A protocol for the Phase 1B field investigation would be prepared under separate cover, and would be submitted to SHPO. The Phase 1B field investigation would occur prior to any construction-related excavation on the site. These investigations and the subsequent mitigation of any findings would avoid any significant adverse impacts to archaeological resources.

6.2.2 Historical Resources

The Mosholu Golf Course Clubhouse, although probably not eligible for listing on the National Register as an individual structure, is of historical note. The structure is reminiscent, on a small scale, of the grand clubhouses erected at private suburban golf courses. The building is a brick Colonial Revival structure built in 1928. The most notable features of the building are the entrance portico and the gables, but these were added in 1971. While photo-documentation of the existing building is not necessary, it is at the discretion of the review agency. However, it would be difficult to capture the look and feel of the 1928 clubhouse due to the 1971 additions.

The proposed Croton WTP would be visually and physically separated from any historic and/or landmarked structures within the park or the surrounding area (e.g., Van Cortlandt Mansion, Vault Hill, and Woodlawn Cemetery). Therefore no significant impacts to existing historic structure are expected.

Construction would entail connections with the buried NCA, a National Register eligible structure. The Aqueduct is still in active use and rehabilitation of a portion of it would be necessary. The effect of these measures on the historic facility would be addressed in subsequent environmental documents. Due to the eligible listing of the NCA, prior to construction, the Secretary of the Interior's Standards for the Treatment of Historic Properties would be consulted to retain the historic character of the structures. This consultation would ensure that any future proposed work would not cause any significant adverse impact to the historic structures.

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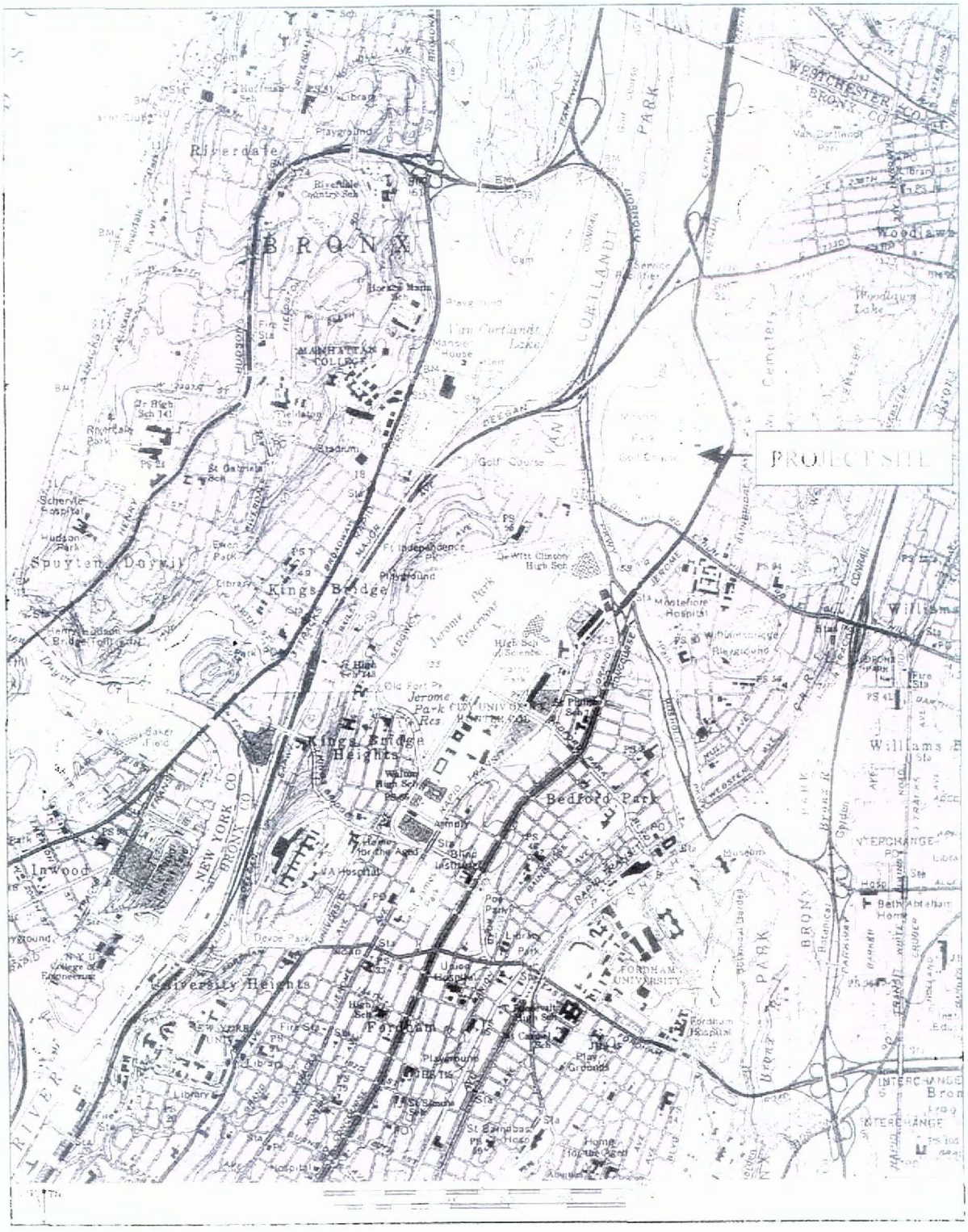


Figure 1. Current U.S.G.S. Topographic Map, Yonkers, NY Quadrangle

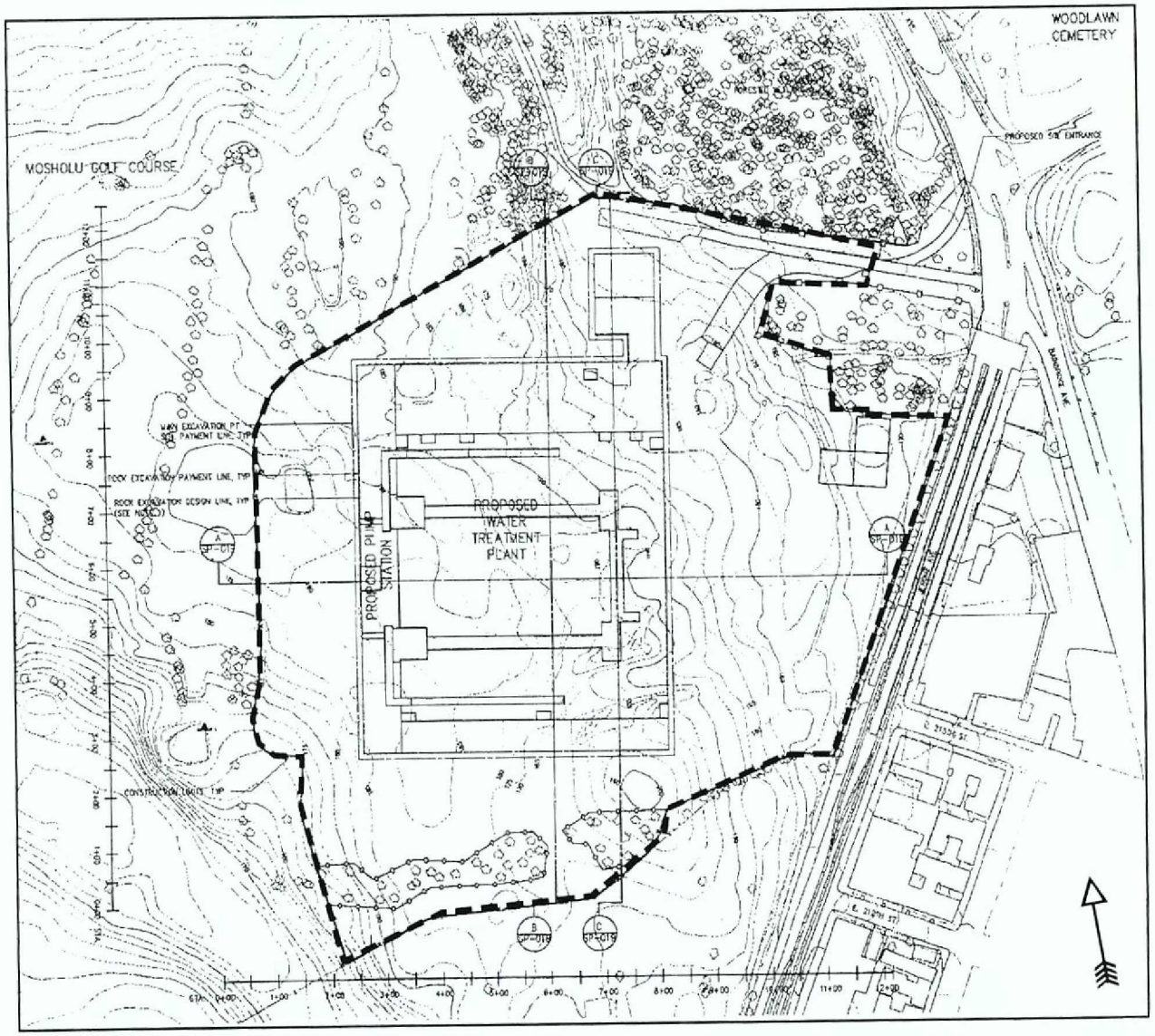


Figure 2: Proposed Mosholu Golf Course Water Treatment Plant site.
Source: Metcalf & Eddy and New York City DEP.

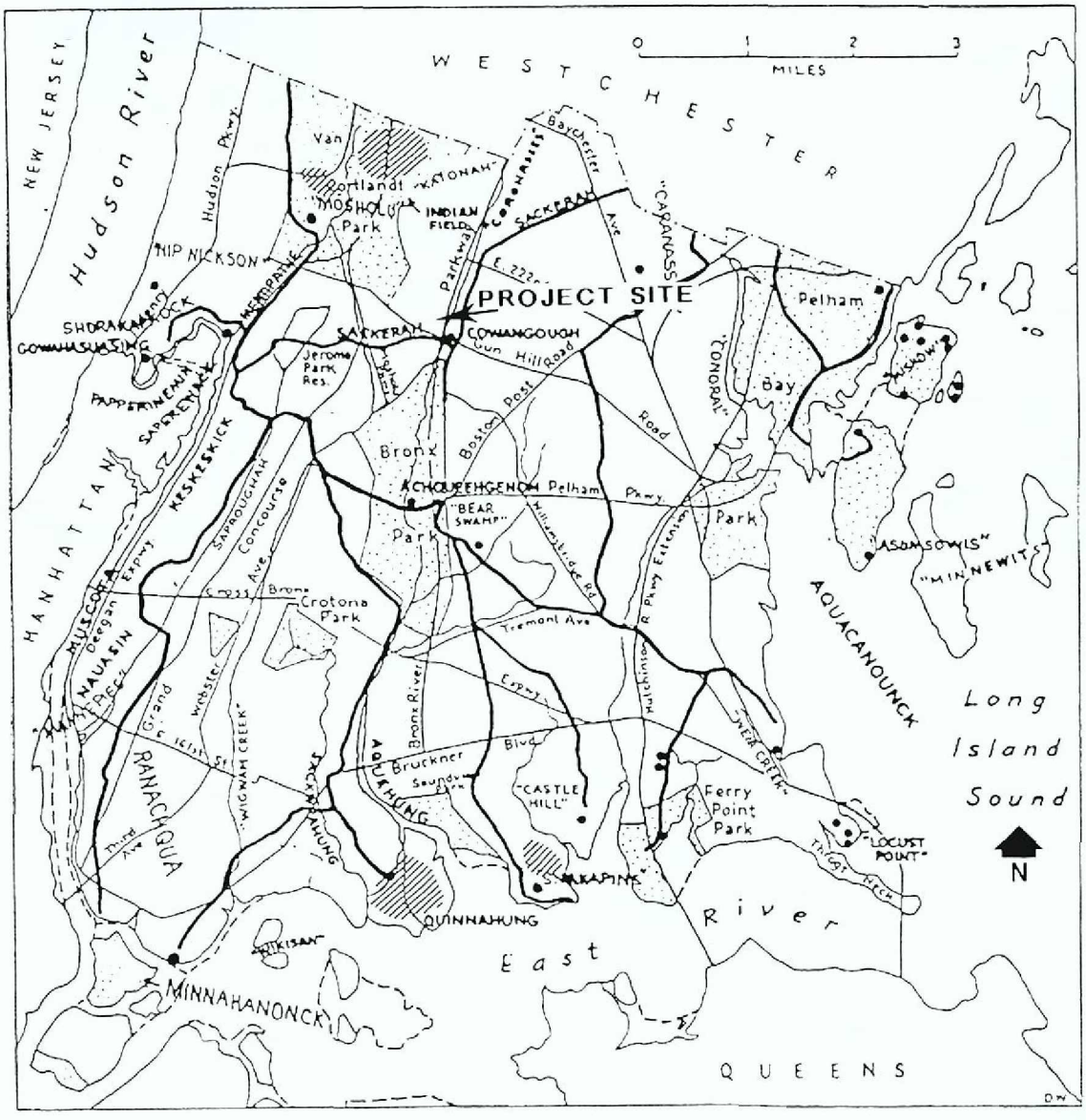


Figure 3: Grumet's *Native American Place Names in New York City*, 1981.
The Bronx.

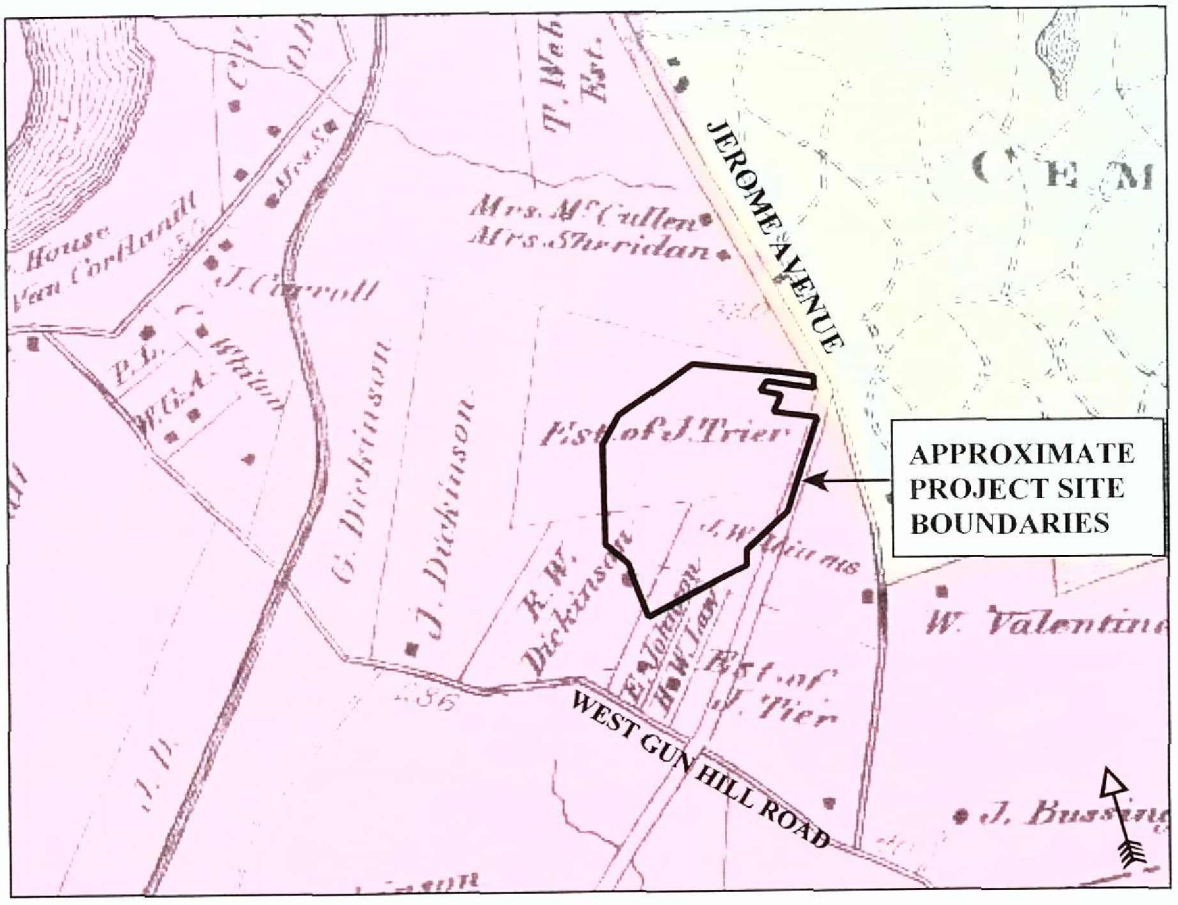


Figure 4: Beers *Yonkers, New York,* 1868.
No Scale.

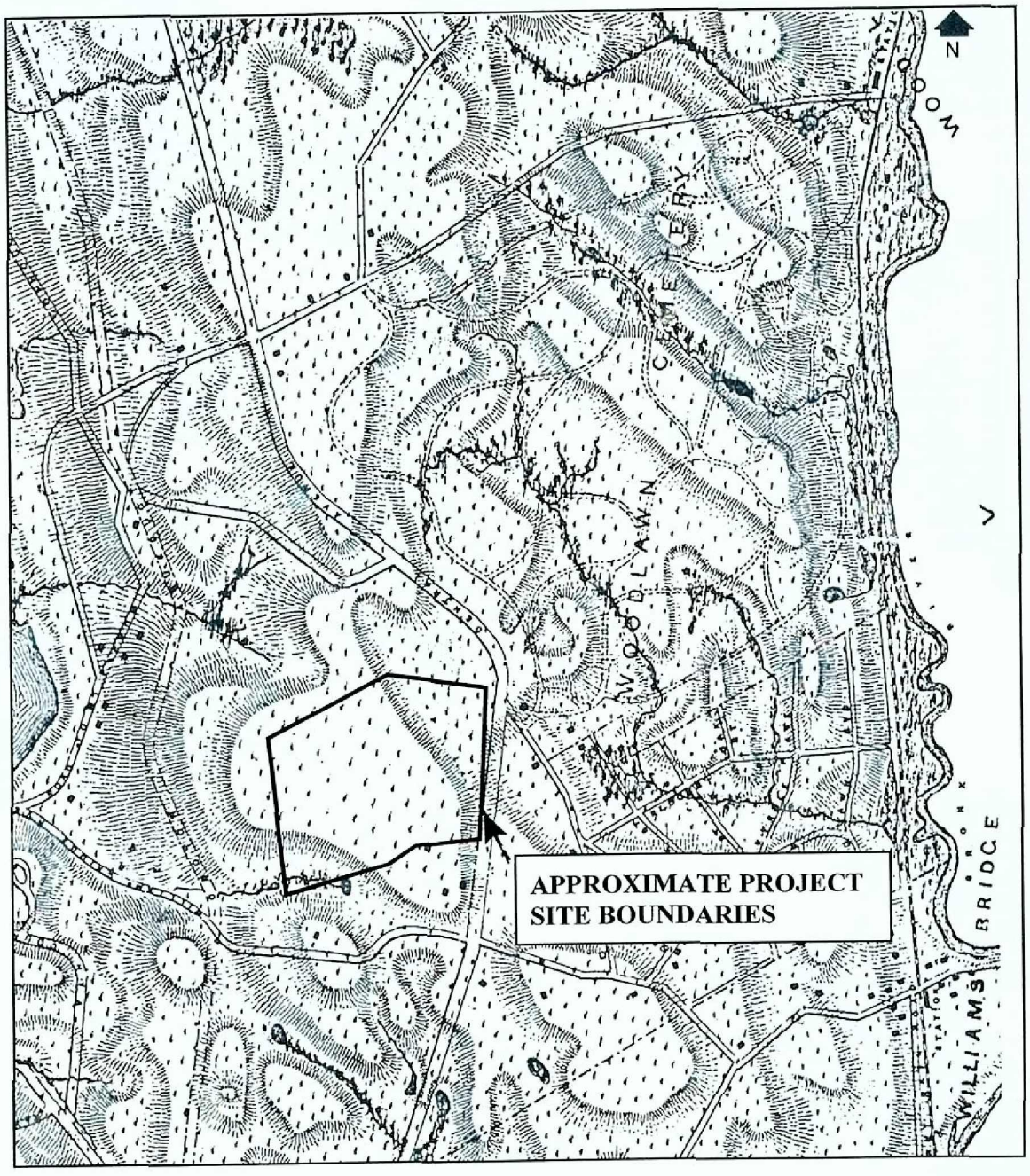


Figure 5: Viele's *Topographical Atlas of the City of New York,* 1874.

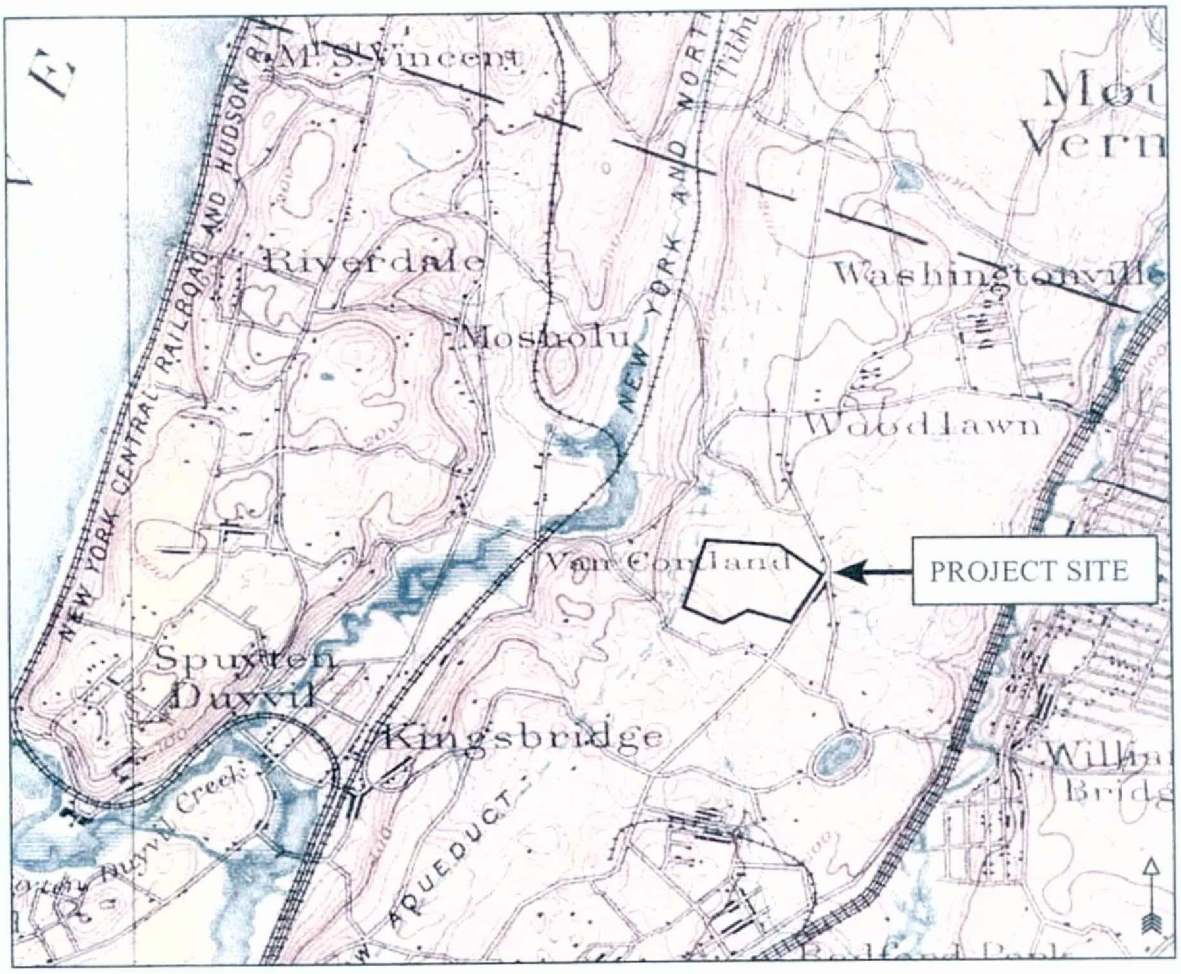
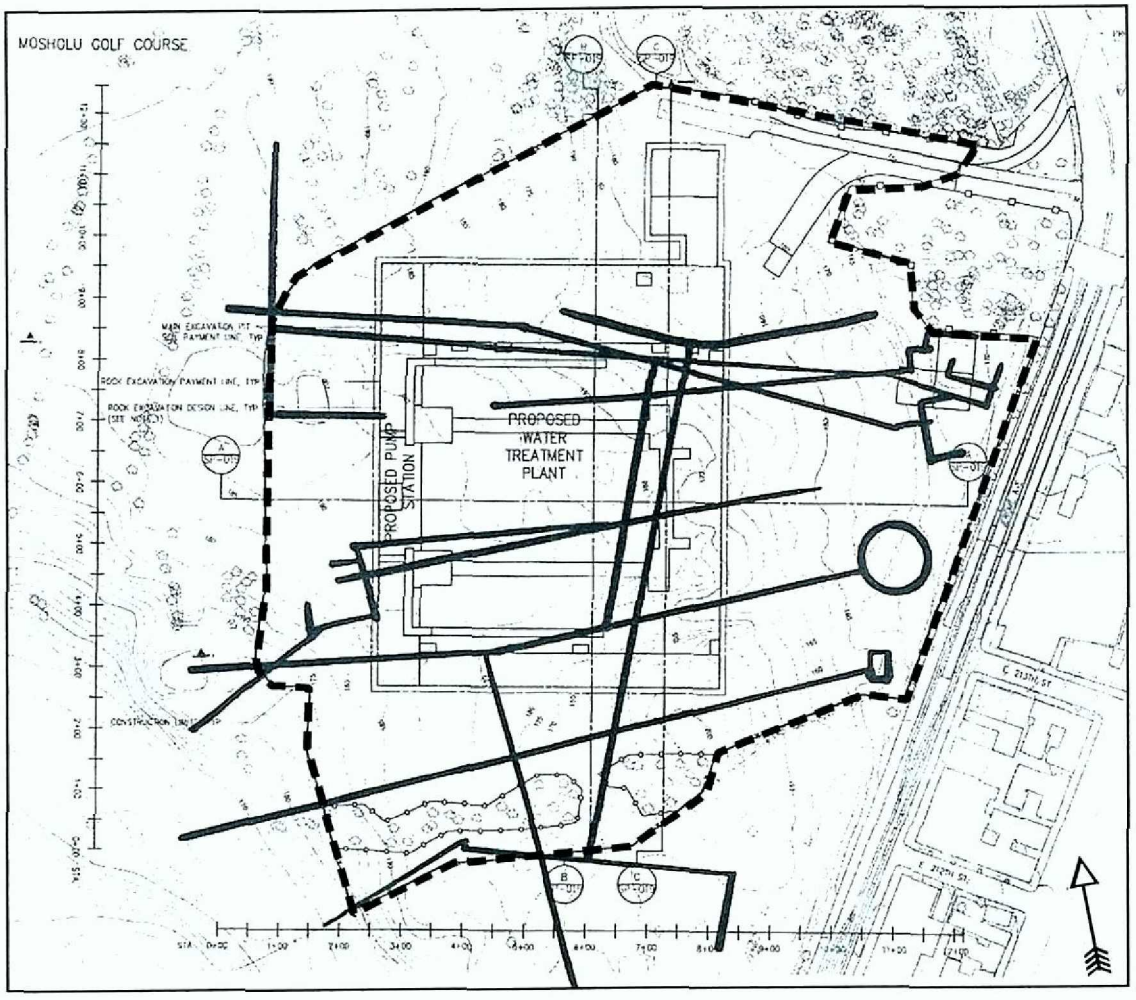


Figure 6: *U.S.G.S. Harlem N.Y.- N.J. Quadrangle*, 1891.
15 Minute Series. No Scale.



KEY

Project Site Boundaries

Irrigation Pipes

Figure 7: Proposed Mosholu Golf Course Water Treatment Plant Site with 1959 and 1982 irrigation pipe locations superimposed.

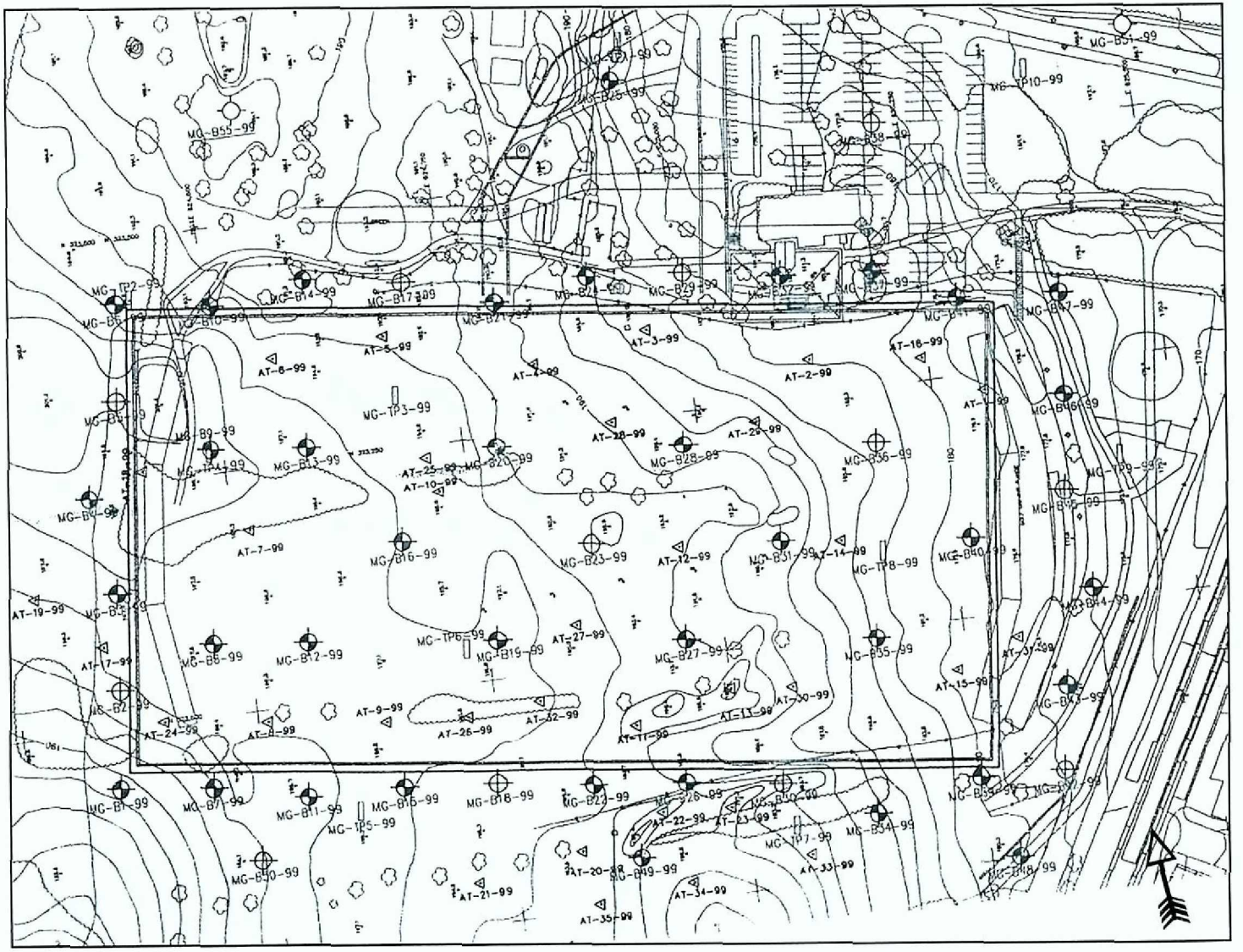


Figure 8: Soil Boring Locations, Mosholu Golf Course Water Treatment Plant Site, 2000.
Source: City of New York DEP, Metcalf & Eddy of New York, Inc. and Hazen and Sawyer, P.C.

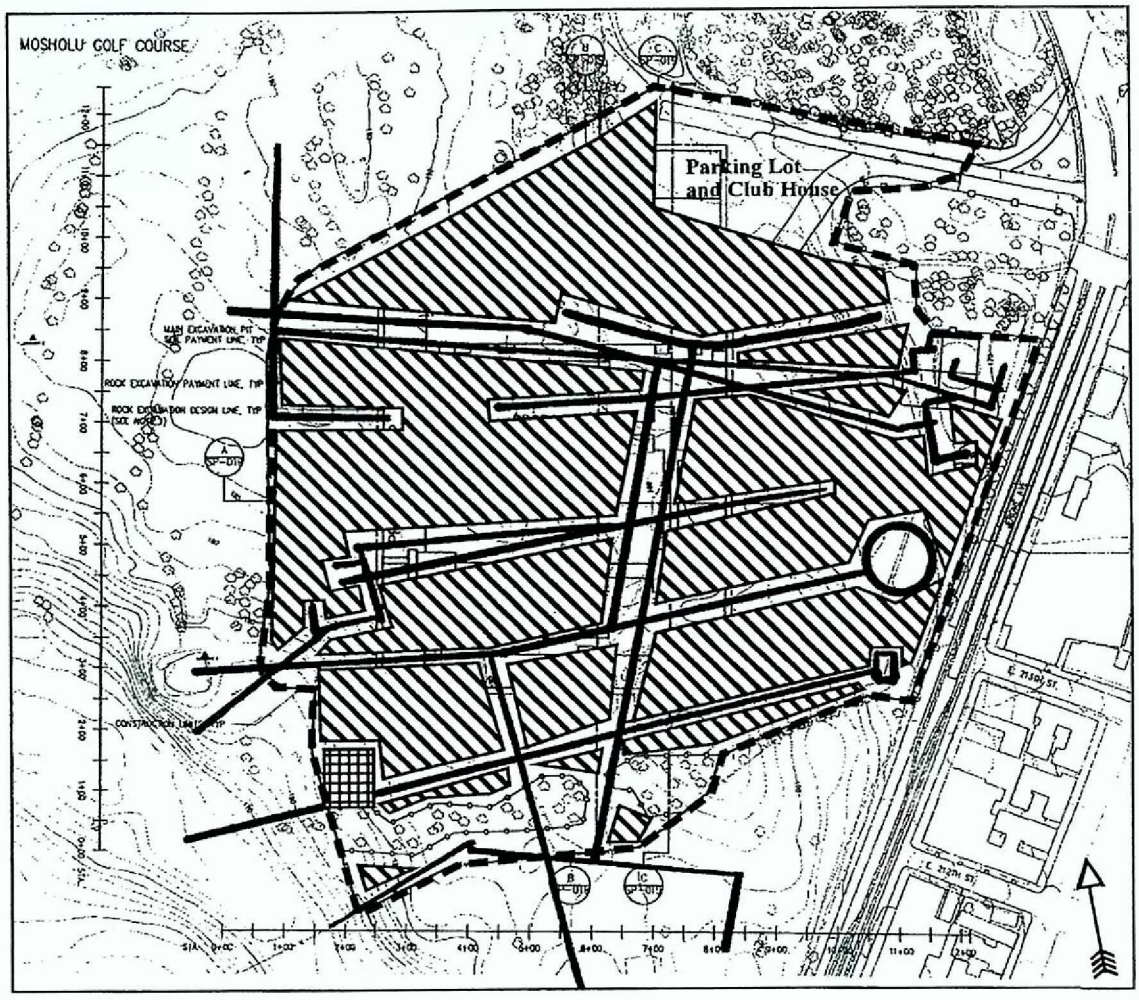


Figure 9: Potential Archaeological Sensitivity.

APPENDIX

Soil Boring Logs

Subsurface Exploration for

The Croton Water Treatment Plant

at Mosholu Golf Course, Van Cortlandt Park

Borough of the Bronx, City of New York

Appendices

City of New York
Department of Environmental Protection
Bureau of Environmental Engineering

November 2000

Metcalf & Eddy of New York, Inc. - HAZEN AND SAWYER, P.C.

A Joint Venture

TABLE OF CONTENTS

APPENDIX A

TEST BORING LOGS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 4
LOCATION BRONX, NY
HOLE NO MG-B1-99
LINE & STA N:322,939.04
OFFSET E:624,346.55

DEPTH ____ FT ____ FT CASING OUT DATE: ____
DEPTH ____ FT ALL CASING OUT DATE. ____

DATE. START: 2-16-99
DATE. FINISH 2-17-99

GROUND ELEVATION 188.36
GROUND WATER ELEVATION 179.06 2/22/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	16"	1	1	1	1		0'-	TOPSOIL 4". DARK BROWN SILT WITH SAND, ORGANIC
		SS2	2'-4'	14"	2	4	12	12		4'	MATTER IN TOP 2 FEET. VERY SOFT TO STIFF. (ML) (11-65)
		SS3	4'-6'	16"	21	24	35	28			
		SS4	6'-8'	10"	38	19	24	28			RUSTY BROWN SILTY FINE SAND TRACE TO
10		SS5	8'-10'	15"	31	38	41	43		10'	SOME GRAVEL, VERY DENSE. (SM) (6-65)
		SS6	10'-10.7'	4"	43	100	/2"			13'	YELLOW BROWN SILTY SAND WITH MICA, ROCK FRAGMENTS (GNEISS), COBBLES. VERY DENSE. POSSIBLE SAPROLITI SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
20		R1	13'-23'	94% REC 91% RQD							GNEISS. MEDIUM GRAY, SLIGHTLY WEATHERED TO UNWEATHERED. SOME OXIDATION ON JOINTS TO 46'. FOLIATION AT 40 DEGREES TO SUB-VERTICAL. QUARTZITI FROM 71' TO 74', 76 TO 79', 92.5' TO 95'. FROM 13' TO 28', 40-DEGREE FOLIATIO JOINTS PREDOMINATE CLOSE TO MODERATEL CLOSE JOINT SPACING.
30		R2	23'-33'	97% REC 76% RQD							
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 4
LOCATION BRONX, NY
HOLE NO MG-B1-99
LINE & STA N:322,939.04
OFFSET E:624,346.55

DEPTH ____ FT ____ FT. CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____
DATE. START 2-16-99
DATE. FINISH 2-17-99
GROUND ELEVATION 188.36
GROUND WATER ELEVATION 179.06 2/22/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ
WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.
HAMMER FALL CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40		R3	33'-43'	97% REC 88% RQD							ROCK IS GENERALLY GOOD. (1-65) FROM 28' TO 40', CLOSE JOINT SPACIN FROM 29.5' TO 31.5', SUBVERTICAL FOLIATION JOINT, SMOOTH, TIGHT, MICA. FROM 38.5' TO 39.2', A 70-DEGREE JOINT WITH FOLIATION TREND, OXIDIZED, ROUGH. AT 40.2' AND 42.3' TWO 60-DEGREE JOINTS WITH FOLIATION TREND, OXIDIZED, CHLORITI ALTERATION, ROUGH. (2-65)
50											
10		R4	43'-53'	98% REC 86% RQD							
		R5	53'-55'	100 % REC 100 % RQD							
60											
20											
		R6	55'-65'	100 % REC 93% RQD							FROM 40' TO 69', MODERATELY CLOSE JOINT SPACING. AT 46.2', A 60-DEGREE JOINT WITH FOLIATION TREND, CHLORITIC ALTERATION, ROUGH. AT 51', A 60-DEGRE JOINT WITH FOLIATION TREND, ALTERATION IN EPIDOTE, ROUGH. FROM 61.75' TO 62' A 70-DEGREE FOLIATION JOINT, SMOOTH, TALC. FROM 40' TO 69', ROCK I
70											
30											
		R7	65'-75'	100 % REC 74% RQD							
80											
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.

SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 4
LOCATION BRONX, NY
HOLE NO MG-81-99
LINE & STA N:322,939.04
OFFSET E:624,346.55

DEPTH ____ FT ____ FT CASING OUT DATE. ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-16-99
DATE. FINISH: 2-17-99

GROUND ELEVATION 188.36
GROUND WATER ELEVATION 179.06 2/22/99

CASING OD HW ID ____
SAMPLER OD. 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80											GENERALLY VERY GOOD. (1-65)
		R8	75'-85'	98% REC							FROM 69' TO 82.5', ROCK IS CLOSELY JOINTED. FROM 69.5 TO 70.3', A SMOOTH FOLIATION JOINT AT 80 DEGREES. FROM 71' TO 82.7', VERY CLOSELY TO CLOSEL JOINTED. FROM 73.7 TO 74.2', A 70-DE-
90				52% RQD							
10											
		R9	85'-95'	100 % REC						95'	GREE FOLIATION JOINT, SMOOTH, MICA FROM 76.5' TO 77.5', AN 85-DEGRE FOLIATION JOINT, SMOOTH, SLIGHTLY ALTERED IN CHLORITE, OPEN, WITH 30-DEGREE JOINTS WITH FOLIATION TREND, SOFT. FROM 79.2' T 79.5', A 70-DEGREE SMOOTH FOLIATION JOINT, EPIDOTE, MICA, OPEN.
				92% RQD							
100											
20											
110											
30											FROM 80' TO 82.5', TWO 80-DEGREE FOLIATION JOINTS, SMOOTH, SOFT, OPEN, CHLORITIC ALTERATION, WITH FOUR 30-DEGREE JOINTS WITH FOLIATION TREND. (3-65)
120											
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 4 OF 4
LOCATION BRONX, NY
HOLE NO MG-B1-99
LINE & STA N:322,939.04
OFFSET E:624,346.55

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT AT CASING OUT DATE ____

DATE. START 2-16-99
DATE. FINISH: 2-17-99

GROUND ELEVATION 188.36
GROUND WATER ELEVATION 179.06 2/22/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											BELOW 82.5', MODERATELY CLOSE T WIDE JOINT SPACING FROM 85' TO 85.4', AN 80-DEGREE FOLIATION JOINT, SMOOTH, MICA, OPEN. AT 92.5', A 60-DEGREE FOLIATION JOINTS, SMOOTH, TIGHT. (1-65)
10											
20											END OF HOLE 95'
30											
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 4
LOCATION BRONX, NY
HOLE NO MG-B2-99
LINE & STA N:323,039.00
OFFSET E:624,359.03

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START 3-4-99
DATE. FINISH 3-10-99

GROUND ELEVATION 194.63
GROUND WATER ELEVATION 186.35 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING ____ SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	18"	1	1	1	2		0'-	FROM 0' TO 2', DAR BROWN SANDY SILT, ORGANIC MATTER,
		SS2	2'-4'	15"	3	5	4	5		4'	SOFT. RUST BROWN, SANDY SILT, STIFF, FROM 2' TO 4' (ML) (11-65)
10		SS3	8'-10'	9"	16	31	40	42		11'	RUSTY BROWN SILTY SAND WITH SANDY SILT INTERLAYERS, ROCK FRAGMENTS. (SM) (6-65)
		R1	11'-15'	95% REC 85% RQD							GNEISS. MEDIUM GRAY, PYRITIC THROUGHOUT, MODERATELY HARD TO HARD, SCHISTOSE TO 37.5', QUARTZITIC BELOW 95'. WEATHERED AND OXIDIZED TO 36.5'. FOLIATION VARIES FROM 40 TO 80 DEGREES. CLOSE TO MODERATELY CLOSE SPACING.
20		R2	15'-24'	98% REC 65% RQD							FRACTURED AND OXIDIZED FROM 17'T 18', 23' TO 24'. SOFT TO MODERATELY HARD FROM 32.7' TC 34.6' WITH SMOOTH FOLIATION JOINTS, OXIDIZED, WEATHERE ZONE. STRONGLY OXIDIZED ON SMOOTH FOLIATION JOINTS, SOFT, FRIABLE, FROM
30		R3	24'-34'	100 % REC 86% RQD							
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 4
LOCATION BRONX, NY
HOLE NO MG-B2-99
LINE & STA N:323,039.00
OFFSET E:624,359.03

DEPTH ____ ft ____ ft CASING OUT DATE. ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE. START 3-4-99
DATE. FINISH 3-10-99

GROUND ELEVATION 194.63
GROUND WATER ELEVATION 186.35 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING ____ SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											35.5' TO 36.5'.
40											FROM 40' TO 44', NINE 10 DEGREE-JOINTS ACROSS FOLIATION, ROUGH, WITH TWO 50-DEGREE FOLIATION JOINTS. (2-65/3-65) ROCK CLASS FROM 11' TO 24', 32.7' TO 54'; (2-65) CLASS FROM 24' TO 32.7'. FRACTURED FROM 48' TO 49', 53' TO 54' ROCK QUALITY IM-PROVES FROM 54' TO 133' WITH MODERATE LY CLOSE TO WIDE JOINT SPACING(1-65
		R4	34'-44'	100 % REC 55% RQD							
50											
10											
		R5	44'-54'	90% REC 58% RQD							
60											
20											
		R6	54'-64'	97% REC 97% RQD							
70											
30											
		R7	64'-74'	100 % REC 100 % RQD							
80											
40											

FROM 90.45'TO 91.1 A SMOOTH 10-DEGREE JOINT ACROSS FOLIATION. AT 133.25', A SMOOTH 10-DEGREE JOINT ACROSS FOLIATION. FROM 135' TO 136.8 A SUBVERTICAL FOLIATION JOINT, SMOOTH, OPEN, ALTERATION IN CHLORITE, WITH FOU 10-DEGREE JOINTS ACROSS FOLIATION, ROUGH, OPEN.

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 4
LOCATION BRONX, NY
HOLE NO MG-B2-99
LINE & STA N:323,039.00
OFFSET E:624,359.03

DEPTH _____ ft ____ ft CASING OUT DATE _____
DEPTH _____ ft ALL CASING OUT DATE _____

DATE START: 3-4-99
DATE FINISH 3-10-99

GROUND ELEVATION 194.63
GROUND WATER ELEVATION 186.35 3/24/99

CASING O.D. HW I.D. _____
SAMPLER O.D. 2" I.D. _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING _____ SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											AT 142' AND 146.3' TWO 40-DEGREE SMOOTH JOINTS ACROSS FOLIATION, ALTERATION IN CHLORITE, EPIDOTE. FROM 146.8' TO 147.2', THREE 30-DEGREE JOINTS WITH FOLIATION TREND, ROUGH, WITH A 10-DEGREE JOINT ACROSS FOLIATION, ROUGH. (2-65) CLASS FROM 133' TO 140'. (1-65) CLASS BELOW 140'.
80											
		R8	74'-84'	100% REC 97% RQD							
90 -10											
		R9	84'-94'	100% REC 95% RQD							
100 -20											
		R10	94'-104'	93% REC 88% RQD							
110 -30		R11	104'-110'	100% REC							
120 -40		R12	110'-120'	98% REC 93% RQD							

Soil Engineer: _____ Driller: GREG MARNEY

Drilling Inspector: _____ Helper: GREG WILLIAMS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 4 OF 4
LOCATION BRONX, NY
HOLE NO. MG-B2-99
LINE & STA. N:323,039.00
OFFSET E:624,359.03

DEPTH _____ FT ___ IN CASING OUT DATE _____
DEPTH _____ FT ALL CASING OUT DATE _____
DATE, START 3-4-99
DATE, FINISH 3-10-99
GROUND ELEVATION 194.63
GROUND WATER ELEVATION 186.35 3/24/99

CASING O.D. HW I.D. _____
SAMPLER O.D. 2" I.D. _____
DIAMOND BIT SIZE NQ
WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN
HAMMER FALL
CASING _____ SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
120											
130		R13	120'-130'	95% REC 82% RQD							
10											
140		R14	130'-140'	95% REC 55% RQD							
20											
150		R15	140'-150'	98% REC 94% RQD						150'	END OF HOLE 150' ORIENTED CORE FROM 110' TO 150'. PERMEABILITY TESTS IN SOIL. WATER PRESSURE TESTS IN ROCK FROM 30' TO 150'. TWO PIEZOMETERS INSTALLED AT 84' AND 149'.
30											
160											
40											

Soil Engineer: _____ Driller: GREG MARNEY

Drilling Inspector: _____ Helper: GREG WILLIAMS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 4
LOCATION BRONX, NY
HOLE NO MG-B3-99
LINE & STA N:323,138.09
OFFSET E: 624,368.95

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE START: 2-19-99
DATE FINISH: 2-24-99

GROUND ELEVATION 197.03
GROUND WATER ELEVATION 184.40 2/26/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	18"	1	1	1	2		0'-	TOPSOIL (3"). DARK GRAY SILT WITH FIN
		SS2	2'-4'	6"	3	3	8	20		3'	SAND, ORGANIC MATTER. SOFT. (ML) (11-65)
		SS3	4'-6'	14"	22	27	31	38			
		SS4	6'-7.2'	12"	31	44	100	/3"			YELLOW BROWN SILTY FINE SAND, TRACE T
		SS5	8'-8.4'	3"	100	/5"					SOME GRAVEL, ROCK FRAGMENTS, COBBLES
10										11'	DENSE TO VERY DENS (SM) (6-65)
		R1	11'-15'	63% REC 25% RQD							GNEISS. MEDIUM GRAY. SLIGHTLY WEATHERED TO UN-WEATHERED. SCHISTOSE(BIOTITE GNEISS) FROM 35.5' TO 40.5', 65'TO 66 105' TO 112.5', 143' TO 150'. AMPHIBOLITIC FROM 112.5' TO 140'. FOLIATION AT 50 DEGREES TO SUB-VERTICAL. FRACTURE TO 23', ALTERATIO IN EPIDOTE AND OXIDATION ON JOINT TO 16.5'.(4-65/ 3-65).
20		R2	15'-23'	44% REC 43% RQD							
		R3	23'-27.5'	93% REC 65% RQD							FAIR, CLOSELY JOINTED ROCK FROM 23' TO 28.5'. SMOOTH JOINTS. TAL AND CARBONATE COAT ING AT 23'. A 40-DEGREE JOINT ALONG FOLIATION WHICH IS
30		R4	27.5'-33'	97% REC 76% RQD							
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 4
LOCATION BRONX, NY
HOLE NO. MG-B3-99
LINE & STA N:323,138.09
OFFSET E: 624,368.95

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START 2-19-99
DATE. FINISH 2-24-99

GROUND ELEVATION 197.03
GROUND WATER ELEVATION 184.40 2/26/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40		R5	33'-42.5'	100 %	REC						STEEPER(50 DEGREES FROM 32.5' TO 37.5 CLOSELY SPACED JOINTS, MAINLY FOLIATION JOINTS, ALTERATION IN CHLORITE, A FEW JOINTS WITH TALC. (3-65).
				75% RQD							
		R6	42.5'-45'	100 %	REC						
				100 %	RQD						
50											
10											FROM 37.5' TO 55' MODERATELY CLOSE T WIDE JOINT SPACING AT 42.5', A SMOOTH 50-DEGREE JOINT. A 70-DEGREE FOLIATIO JOINT. FROM 51.7' TO 52.6' (1-65)
		R7	45'-55'	98% REC							
				83% RQD							
60											
20											FROM 54.5' TO 58.5' ROCK IS CLOSELY JOINTED. FROM 58.5 TO 65', MODERATELY CLOSE JOINTED SPACING. A 50-DE GREE JOINTS ACROSE FOLIATION, SMOOTH, OPEN, FROM 57' TOC 58'. (2-65)
		R8	55'-65'	99% REC							
				78% RQD							
70											
30											FROM 65' TO 76.7', ROCK IS CLOSELY JOINTED WITH SMOOT JOINTS. FROM 65' T 66.3', THREE SMOOT FOLIATION JOINTS A 75'. FROM 66.5' TC 67', A 60-DEGREE FOLIATION JOINT, SMOOTH, MICA.
		R9	65'-75'	96% REC							
				42% RQD							
80											
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 4
LOCATION BRONX, NY
HOLE NO MG-B3-99
LINE & STA N:323,138.09
OFFSET E: 624,368.95

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-19-99
DATE FINISH 2-24-99

GROUND ELEVATION 197.03
GROUND WATER ELEVATION 184.40 2/26/99

CASING O.D. HW ____ I.D. ____
SAMPLER O.D. 2" ____ I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80											FROM 71' TO 73', THREE SMOOTH 60-DEGREE FOLIATION JOINTS, CHLORITE ALTERATION WITH THREE 20 TO 40-DEGREE JOINTS ACROSS FOLIATION. FROM 74.5' TO 75', A 75 DEGREE FOLIATION JOINT, SMOOTH, MICA FROM 76' TO 76.7', SMOOTH FOLIATION JOINTS WITH TALC COATING. (3-65)
		R1	75'-85'	93% REC 73% RQD							
90											
10											
		R1	85'-95'	99% REC 98% RQD							
100											
20											
		R12	95'-105'	97% REC 91% RQD							
110											
30											
		R13	105'-113'	98% REC 87% RQD							
120											
40											

ROCK QUALITY IMPROVES AT 76.7' SUBHORIZONTAL JOINTS PREDOMINATE FROM 76.7' TO 133'. FROM 83' TO 84', A CURVED 75-DEGREE FOLIATION JOINT, SMOOTH. FROM 97.2' TO 99.5', A SUB-VERTICAL FOLIATION JOINTS, SMOOTH. FROM 140.7' TO 141.2', A 50-DEGRE FOLIATION JOINT, SMOOTH. AT 142.25' A 50-DEGREE FOLIATION JOINT, SMOOTH. IN GENERAL GOOD ROCK. (1-65)

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 4 OF 4
LOCATION BRONX, NY
HOLE NO. MG-B3-99
LINE & STA N:323,138.09
OFFSET E: 624,368.95

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-19-99
DATE. FINISH: 2-24-99

GROUND ELEVATION 197.03
GROUND WATER ELEVATION 184.40 2/26/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
120		R14	113'-123'	96% REC 93% RQD							
130											
10		R15	123'-133'	100 % REC 100 % RQD							
140											
20		R16	133'-140'	98% REC 93% RQD							
150											
30		R17	140'-150'	98% REC 90% RQD						150'	END OF HOLE 150'
160											
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B4-99
LINE & STA N:323,241.02
OFFSET E:624,352.78

DEPTH ____ FT ____ FT. CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START. 2-25-99
DATE. FINISH: 2-26-99

GROUND ELEVATION 198.82
GROUND WATER ELEVATION ____

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300 LBS
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	ANGLED BOREHOLE DIRECTION: N 82 DEGREES E ANGLE:60 DEGREES ROLLER BIT TO TOP OF ROCK NOTE: ALL DEPTHS SHOWN AS "DOWN-HOLE" OR NON-VERTICAL
10										15'	GNEISS. MEDIUM GRAY. MODERATELY WEATHERED TO UN-WEATHERED, MODERATELY HARD. AMPHIBOLITIC FROM 50' TO 56', 97.5' TO 100';QUARTZITIC FROM 64' TO 66'; 100' TO 104.5'; SCHISTOSE (MICA) FROM 33' TO 34',40 TO 50'; 66' TO 68' 78.5' TO 80'. FOLIATION VARIES FROM 20 TO 40 DE-GREES TO 48' AND FROM 50 TO 70 DE-GREES ON REST OF CORE. OXIDATION ON JOINT TO 28.5' AND FROM 66.1' TO 69' ON 60 DEGREE JOINTS ACROSS FOLIATION
20		R1	15'-25'	96% REC 48% RQD							
30		R2	25'-35'	91% REC 54% RQD							
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B4-99
LINE & STA N:323,241.02
OFFSET E:624,352.78

DEPTH _____ FT ____ FT CASING OUT DATE _____
DEPTH _____ FT ALL CASING OUT DATE _____
DATE START 2-25-99
DATE FINISH 2-26-99
GROUND ELEVATION 198.82
GROUND WATER ELEVATION _____

CASING O.D. HW I.D. _____
SAMPLER O.D. 2" I.D. _____
DIAMOND BIT SIZE NQ
WEIGHT OF HAMMER 300 LBS.
INSIDE LENGTH OF SAMPLER _____ IN
HAMMER FALL
CASING _____ SAMPLER _____

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										
40										
	R3	35'-45'	96% REC 63% RQD							
50										
10										
	R4	45'-55'	96% REC 64% RQD							
60										
20										
	R5	55'-65'	98% REC 96% RQD							
70										
30										
	R6	65'-75'	92% REC 81% RQD							
80										
40										

CLOSE JOINT SPACIN FROM 17.5' TO 22', 33.5' TO 50', MAINLY FOLIATION JOINTS, SMOOTH. FROM 21.5' TO 22', VERTICAL JOINT, SILT COATING. AT 38.5', A VERY SMOOTH JOINT, ALTERATION IN CHLORITE AND EPIDOTE, POSSIBLE SHEAR.

FROM 47' TO 51.25' SOFT, FRIABLE, CHLORITE ALTERATION, WITH FIV FOLIATION JOINTS A 70 DEGREES FROM 48.5' TO 50'.(3-65 BELOW 51.25', CLOS TO MODERATELY CLOS JOINT SPACING. QUARTZITIC ZONE FROM 66' TO 68' WITH THREE 60-DEGREE JOINTS, ROUGH TIGHT, OXIDIZED. SMOOTH 30-DEGREE JOINTS AT 76.5', 79.7' TO 80', 97.5' TO 105'.

Soil Engineer: _____ Driller: GREG MARNEY

Drilling Inspector: _____ Helper: GREG WILLIAMS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO MG-B4-99
LINE & STA N:323,241.02
OFFSET E:624,352.78

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-25-99
DATE FINISH: 2-26-99

GROUND ELEVATION 198.82
GROUND WATER ELEVATION ____

CASING O.D. HW ____ I.D. ____
SAMPLER O.D. 2" ____ I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300 LBS
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80											AT 97.5', 98.5', FOLIATION JOINTS, SMOOTH, TIGHT, EPIDOTE, MICA. IRREGULAR, CURVED JOINT AT 100.25' TO 101.4' ALONG A QUARTZITE BAND, SMOOTH, TIGHT, CHLORITE. (1-65)
		R7	75'-85'	98% REC 93% RQD							
90											
10											
		R8	85'-95'	98% REC 93% RQD							
100											
20											
		R9	95'-105'	100 % REC 87% RQD						105'	
											END OF HOLE 105'
110											
30											
120											
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B5-99
LINE & STA N:323,338.35
OFFSET E:624,394.20

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 3-4-99
DATE FINISH 3-8-99

GROUND ELEVATION 199.49
GROUND WATER ELEVATION 185.58 3/24/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-2'	TOPSOIL (4"). DARK BROWN SILTY FINE SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS1	0'-2'	17"	1	2	2	4			
		SS2	2'-4'	14"	3	2	3	5			YELLOW BROWN SILTY F-M SAND, TRACE GRAVEL. LOOSE TO DENSE. (SM) (7-65)
		SS3	4'-6'	11"	4	6	7	9			
		SS4	6'-8'	12"	12	13	17	27			
10		SS5	8'-10'	10"	11	15	18	29		11'	
		SS6	10'-12'	8"	20	23	29	31			GRAY BROWN SILTY MEDIUM SAND, MICA, ROCK FRAGMENTS. VERY DENSE. POSSIBLE SAPROLITI SOIL. (SM AND GM) (6-65)
		SS7	12'-13'	2"	30	41	100	/0"		13'	
20		R1	13'-23'	98% REC 30% RQD							GNEISS. LIGHT TO MEDIUM GRAY, AMPHIBOLITIC BELOW 35.5'. IN GENERAL MODERATELY HARD TC HARD WITH SOFT ANC FRIABLE ZONES FROM 15' TO 16.5', 19' TO 20.75', 22.5' T 26'. WEATHERED FRC 13' TO 26'. FOLIATION AT 40 DEGREES TO SUB-VERTICAL, MOSTLY 6 60 TO 70 DEGREES. FOLIATION INDISTINCT FROM 13' TO 15', 51.5' TO 62'.
30		R2	23'-33'	98% REC 43% RQD							
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B5-99
LINE & STA. N:323,338.35
OFFSET E:624,394.20

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE. ____

DATE START 3-4-99
DATE FINISH 3-8-99

GROUND ELEVATION 199.49
GROUND WATER ELEVATION 185.58 3/24/99

CASING O.D HW ID ____
SAMPLER O.D 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											OXIDATION ON JOINT TO 26'.
40		R3	33'-43'	100 %		REC					CLOSE JOINT SPACIN FROM 17.25' TO 28.6', FROM 15' TO 16.5', A SUB-VERTICAL FOLIATION JOINT, STRONGLY WEATHERED, SOFT AN FRIABLE, TIGHT. FROM 19' TO 20.75' FRACTURED ZONE, SOFT AND FRIABLE. FROM 22.5' TO 26', FRACTURED, OXIDIZED FROM 26' TO 28.6', FOLIATION JOINTS A 60 TO 80 DEGREES, SMOOTH, OPEN. (3-65) CLASS FROM 13' TO 28.6'.
				62% RQD							
50											
10											
		R4	43'-53'	100 %		REC					
				82% RQD							
60											
20											
		R5	53'-63'	100 %		REC					ROCK QUALITY IM-PROVES AT 28.6' CLOSELY JOINTED FROM 32.25' TO 35.5'. FROM 32.5' T TO 34.3', SEVEN FOLIATION JOINTS A 60 DEGREES, SMOOTH TIGHT. SMOOTH FOLIATION JOINTS A 60 DEGREES AT 35.5', 40.5', 50.3' TO 51', 51.75', 53' (2-65) CLASS FROM 28.6' TO 53'.
				100 % RQD							
		R6	63'-65'	100 %		REC					
				91% RQD							
70											
30											
		R7	65'-75'	100 %		REC				75'	
				92% RQD							
80											
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO MG-B5-99
LINE & STA N:323,338.35
OFFSET E:624,394.20

DEPTH _____ FT. ___ FT CASING OUT DATE _____
DEPTH _____ FT ALL CASING OUT DATE _____

DATE START: 3-4-99
DATE FINISH 3-8-99

GROUND ELEVATION 199.49
GROUND WATER ELEVATION 185.58 3/24/99

CASING O.D HW I.D _____
SAMPLER O.D 2" I.D _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0								MODERATELY CLOSE TO WIDE JOINT SPACING BELOW 53'. AT 72.3', A 40-DEGREE JOINT WITH FOLIATION TREND, CARBONATE COATING. (1-65)
		10								END OF HOLE 75'
		20								ORIENTED CORE FROM 65' TO 75'. PERMEABILITY TESTS IN SOIL. WATER PRESSURE TESTS IN ROCK FROM 15' TO 75'. PIEZOMETER INSTALLED AT 74'.
		30								
		40								

Soil Engineer: _____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: _____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET ____ OF ____
LOCATION BRONX, NY
HOLE NO MG-B6-99
LINE & STA N:323,437.24
OFFSET E:624,405.81

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-19-99
DATE FINISH: 2-22-99

GROUND ELEVATION 195.84
GROUND WATER ELEVATION 182.65 2/23/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	16"	6	5	4	5		0'-2'	TOPSOIL(2"). DARK BROWN SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	15"	5	7	7	10			
		SS3	4'-6'	18"	8	7	11	20			ORANGE BROWN SILTY F-M SAND FROM 2' T 4', COARSE SAND
		SS4	6'-8'	14"	22	38	34	37		8'	FROM 4' TO 6' WIT TRACE TO LITTLE GRAVEL. SOME GRAVE BELOW 8'. MEDIUM DENSE TO DENSE. (SM AND GM)(6-65)
10		SS5	8'-10'	12"	21	29	33	37			
		SS6	10'-12'	12"	30	34	48	50		13'	YELLOW BROWN SILTY F-M SAND, SOME GRAVEL, MICA, ROCK FRAGMENTS. VERY DENSE. POSSIBLE SAPROLITI SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
20		R1	13'-23'	89% REC 72% RQD							GNEISS. LIGHT TO MEDIUM GREEN GRAY, AMPHIBOLITIC GNEISS, MODERATELY WEATHERED TO UN-WEATHERED, MEDIUM HARD TO HARD. QUARTZITIC BANDS FROM 68' TO 72' AN FROM 73.5' TO 77'. FOLIATION AT 60 DE GREES TO SUB-VERTICAL. OXIDATIC ON JOINTS TO 18'.
30		R2	23'-33'	94% REC 81% RQD							FROM 13' TO 21', CLOSE TO MODERATEL JOINT SPACING.
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 4
LOCATION BRONX, NY
HOLE NO MG-B6-99
LINE & STA N:323,437.24
OFFSET E:624,405.81

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-19-99
DATE FINISH 2-22-99

GROUND ELEVATION 195.84
GROUND WATER ELEVATION 182.65 2/25/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										
40										
	R3	33'-43'	100 %		REC					
			77%	RQD						
50										
10										
	R4	43'-53'	100 %		REC					
			95%	RQD						
60										
20										
	R5	53'-63'	100 %		REC					
			99%		RQD					
70										
30										
	R6	63'-73'	99%	REC						
			94%	RQD						
	R7	73'-78'	100 %		REC				78'	
80			100 %		RQD					
40										

FROM 17.25' TO 18' A 70-DEGREE FOLIATION JOINT, SMOOTH, OXIDIZED, SOFT, FIABLE, TALC COATING, OPEN, INTERSECTED AT 17.6' BY A 60-DEGREE JOINT ACROSS FOLIATION AND A 20-DEGREE JOINT WITH FOLIATION TREND, SMOOTH, OPEN.

FROM 19.25' TO 19.5', A 70-DEGREE FOLIATION JOINT, SMOOTH, TIGHT, AN 80-DEGREE JOINT WITH FOLIATION TREND, SMOOTH, TIGHT; AND A 60-DEGREE WITH FOLIATIOI TREND, SMOOTH, OPEN. IN GENERAL, FAIR ROCK TO 21'. (3-65/2-65)

MODERATELY CLOSE TO JOINT SPACING FROM 21' TO 43'.

AT 25.8', A 70-DEGREE FOLIATION JOINT, SMOOTH, TIGHT.
AT 28.3', A 50-DEGREE JOINT WITH FOLIATION TREND, SMOOTH, OPEN.

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET — OF —
LOCATION BRONX, NY
HOLE NO MG-B6-99
LINE & STA N:323,437.24
OFFSET E:624,405.81

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-19-99
DATE FINISH: 2-22-99

GROUND ELEVATION 195.84
GROUND WATER ELEVATION 182.65 2/23/99

CASING O D HW ____ I.D ____
SAMPLER O D 2" ____ I D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV · FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0								AT 28.1' TO 29.2', A SUBVERTICAL FOLIATION JOINT, IRREGULAR, SMOOTH, TIGHT, WITH A 25-DEGREE JOINT ACROS FOLIATION, ROUGH, TIGHT. FROM 29.8' TO 30.2' TWO 70-DEGREE FOLIATION JOINTS, SMOOTH, TIGHT, WIT A 10-DEGREE JOINT ACROSS FOLIATION, ROUGH, OPEN. FROM 33' TO 34.8', A 75 TO 80-DEGREE JOINTS ACROSS FOLIATION, CURVED, IRREGULAR, ROUGH, TIGHT, WITH TWO 20-DEGREE JOINTS ACROSS FOLIATION, SMOOTH, TIGHT. FROM 36.8' TO 38', 70-DEGREE FOLIATIO JOINT, SMOOTH, SOFT OPEN WITH A 10-DE-GREE JOINT ACROSS FOLIATION, ROUGH, TIGHT. FROM 40.7' TO 42.2' A 75-DEGREE FOLIA-TION JOINT, IRREGU-LAR, SMOOTH, TIGHT, WITH A 50-DEGREE JOINT ACROSS FOLIA TION, SMOOTH, TIGHT (2-65)
		10								
		20								
		30								
		40								

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 4
LOCATION BRONX, NY
HOLE NO. MG-B6-99
LINE & STA. N:323,437.24
OFFSET E:624,405.81

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-19-99
DATE. FINISH: 2-22-99

GROUND ELEVATION 195.84
GROUND WATER ELEVATION 182.65 2/23/99

CASING O.D. HW ____ I.D. ____
SAMPLER O.D. 2" ____ I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											ROCK QUALITY IMPROVES BELOW 43', MODERATELY CLOSE T WIDE JOINT SPACING FROM 46.3'TO 46.8' A 70-DEGREE FOLIATION JOINT, SMOOTH TIGHT, WITH A 50-DEGREE JOINT ACROS FOLIATION, SMOOTH, TIGHT. AT 64.5'. A 60-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT. FROM 71.3'TO 71.8' CLOSELY JOINTED WITH SUBHORIZONTAL JOINTS, ROUGH, OPEN. (1-65)
10											
20											
30											END OF HOLE 78'
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

SUB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B7-99
LINE & STA N:322,927.76
OFFSET E:624,444.51

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE, START 2-16-99
DATE, FINISH 2-17-99

GROUND ELEVATION 193.46
GROUND WATER ELEVATION 186.06 2/23/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	TOPSOIL(3"). DARK
		SS1	0'-2'	16"	1	1	1	1		2'	GRAY BROWN SANDY SILT, ORGANIC MATTER. VERY SOFT. (ML) (11-65)
		SS2	2'-4'	14"	2	6	7	7			
		SS3	4'-5'	8"	21	100	/6"				
		SS4	6'-7.4'	6"	29	47	100	/5"			TAN BROWN SILTY FINE SAND, TRACE
		SS5	8'-8.4'	4"	100	/5"				8'	GRAVEL. MEDIUM DENSE TO VERY DENSE. (SM)(7-65)
10											
		SS6	10'-11'	4"	66	100	/6"				YELLOW BROWN SILTY F-M SAND WITH MICA ROCK FRAGMENTS,
										14'	BOULDERS. VERY DENSE POSSIBLE SAPROLITIC SOIL (DECOMPOSED ROCK). (SM AND GM)(6-65/ 5-65). ROLLER BIT FROM 11' TO 15'.
20											GNEISS. MEDIUM GRAY OXIDATION TO 20'. FOLIATION AT 60 DEGREES TO SUB-VERTICAL.
		R1	15'-25'	98%	REC						FROM 15' TO 35' MODERATELY HARD, SLIGHTLY WEATHERED FRACTURED FROM 15' TO 17'. AT 16.25', AN 80-DEGREE FOLIATION JOINT, ROUGH, TIGHT, OXIDIZED, WITH THREE 10-DEGREE JOINTS ACROSS FOLIATION, OPEN, ROUGH. AT 19.7', 20.6', 70-DEGREE
				80%	RQD						
30											
		R2	25'-35'	97%	REC						
				84%	RQD						
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B7-99
LINE & STA N:322,927.76
OFFSET E:524,444.51

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE. START 2-16-99
DATE. FINISH 2-17-99

GROUND ELEVATION 193.46
GROUND WATER ELEVATION 186.06 2/23/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											FOLIATION JOINTS, SMOOTH, OXIDIZED, TIGHT.
40		R3	35'-45'	100 %		REC					AT 21.4', A 70-DEGREE JOINT WITH FOLIATION TREND, ROUGH, TIGHT, EPIDOTE.
				100 %		RQD					BELOW 22',5 TO 10-DEGREE JOINTS PREDOMINATE, ROUGH (2-65)
50 -10											
		R4	45'-55'	100 %		REC					VERY GOOD ROCK WIT MODERATELY CLOSE JOINT SPACING BELOW 35'.
				98%		RQD					
60 -20											
		R5	55'-65'	100 %		REC					FROM 55.3' TO 56', A SUBVERTICAL FOLIATION JOINT, ROUGH, TIGHT, WITH TWO 5 TO 10-DEGREE JOINTS ACROSS FOLIATION, OPEN, ROUGH.
				90%		RQD					AT 62.5', A 70-DEGREE FOLIATION JOINT, ROUGH, TIGHT.
70 -30											FROM 63.2' TO 63.4' A SUBVERTICAL FOLIATION JOINT, SMOOTH, TIGHT, MICA, WITH A 60-DE GREE JOINT WITH FOLIATION TREND
		R6	65'-75'	100 %		REC					AT 63.4', SMOOTH,
				98%		RQD					
80 -40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET _ OF _
LOCATION BRONX, NY
HOLE NO. MG-B7-99
LINE & STA. N:322,927.76
OFFSET E:624,444.51

DEPTH _____ ft ___ ft CASING OUT DATE _____
DEPTH _____ ft ALL CASING OUT DATE _____

DATE START 2-16-99
DATE FINISH 2-17-99

GROUND ELEVATION 193.46
GROUND WATER ELEVATION 186.06 2/23/99

CASING O.D. HW ID _____
SAMPLER O.D. 2" ID _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											OPEN.
80											QUARTZITIC BAND FROM 82' TO 85'. FOLIATION AT 60 DEGREES TO SUB-VERTICAL. (1-65)
		R7	75'-85'	100 %	REC					85'	
				98%	RQD						END OF HOLE 85'
90											
-10											
100											
-20											
110											
-30											
120											
-40											

Soil Engineer: _____ Driller: GREG MARNEY

Drilling Inspector: _____ Helper: GREG WILLIAMS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

LOCATION BRONX, NY
HOLE NO MG-B8-99
LINE & STA N:323,075.62
OFFSET E:624,463.08

DEPTH ____ FT ____ FT CASING OUT DATE: ____
DEPTH ____ FT ALL CASING OUT DATE: ____

DATE START: 2-17-99
DATE FINISH: 2-19-99

GROUND ELEVATION 195.42
GROUND WATER ELEVATION 186.80 2/23/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
	SS1	0'-2'	14"	9	11	15	11		0'-	TOPSOIL (4"). DARK
									2'	BROWN SILTY FINE SAND, ORGANIC MATTER. MEDIUM DENSE. (SM)(11-65)
	SS2	2'-4'	13"	17	20	20	24			
	SS3	4'-4.3'	4"	100	/4"				6'	YELLOW BROWN SILTY F-M SAND, TRACE GRAVEL, COBBLES. DENSE. (SM) (7-65)
										GNEISS. LIGHT TO MEDIUM GRAY, SLIGHTLY SCHISTOSE FROM 6' TO 15'. FOLIATION AT 50 DEGREES TO SUBVERTICAL. OXIDATION ON JOINTS TO 26.5'.
	R1	6'-14'	91%	REC						
			35%	RQD						
										FROM 8.5' TO 15', FRACTURED ZONE, STRONGLY OXIDIZED AND WEATHERED, WIT A SUBVERTICAL FOLIATION JOINT FROM 12' TO 14', OPEN, INTERSECTED BY SIX SUBHORIZONTAL JOINTS ACROSS FOLIATION. A 60-DEGREE JOINT ACROSS FOLIATION AT 15', OXIDIZED, SMOOTH, TIGHT. (3-65/4-65)
	R2	14'-24'	96%	REC						
			92%	RQD						
	R3	24'-34'	100 %	REC						
			100 %	RQD						

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B8-99
LINE & STA N:323,075.62
OFFSET E:624,463.08

DEPTH ____ FT ____ FT CASING OUT DATE. ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-17-99
DATE. FINISH: 2-19-99

GROUND ELEVATION 195.42
GROUND WATER ELEVATION 186.80 2/23/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0								
		40								
	R4	34'-44'	99% REC 95% RQD							
		50								
		-10								
	R5	44'-54'	99% REC 97% RQD							
		60								
		-20								
	R6	54'-64'	98% REC 93% RQD							
		70								
		-30								
	R7	64'-74'	99% REC 98% RQD							
		80								
		-40								

BELOW 15', MODERATELY CLOSE JOINT SPACING TO 24'. MODERATELY CLOSE TO WIDE SPACING BELOW 24'.

AT 19', A 60-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT.
AT 25', 26.5' AND 27.25', THREE 70-DEGREE JOINTS ACROSS FOLIATION, TIGHT, SMOOTH, OXIDIZED TO 26.5'.
AT 59', A 60-DEGREE FOLIATION JOINT, SMOOTH, TIGHT.
IN GENERAL, VERY GOOD ROCK BELOW 24'. (1-65)

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET ____ OF ____
LOCATION BRONX, NY
HOLE NO MG-88-99
LINE & STA N:323,075.62
OFFSET E:624,463.08

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE, START 2-17-99
DATE, FINISH 2-19-99

GROUND ELEVATION 195.42
GROUND WATER ELEVATION 186.80 2123199

CASING O.D. HW ____ I.D. ____
SAMPLER O.D. 2" ____ I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80											
		RB	74'-84'	100 %	REC					84'	
				96% RQD							END OF HOLE 84'
90											
10											
100											
20											
110											
30											
120											
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 4
LOCATION BRONX, NY
HOLE NO MG-B9-99
LINE & STA N:323,275.41
OFFSET E:624,486.52

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-15-99
DATE FINISH 2-16-99

GROUND ELEVATION 198.13
GROUND WATER ELEVATION 190.87 2/17/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE ____

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24 SAMPLER 30

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0 o	6 12	12 - 18	18 - 24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	12"	4	5	4	3		0'-2'	TOPSOIL(6")DARK BROWN SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	14"	4	5	4	3			
		SS3	4'-6'	14"	27	35	43	100	/4"	5'	BROWN SILTY FINE SAND, TRACE FINE T MEDIUM GRAVEL. LOOSE TO VERY DENSE. (SM) (7-65)
		SS4	6'-8'	10"	10	17	24	37			
10		SS5	8'-10'	12"	14	24	30	31			
		SS6	12'-12'1"	1"	100	/2"				13'	TAN BROWN SILTY F-M SAND WITH MICA ROCK FRAGMENTS (GNEISS). VERY DENSE. POSSIBLE SAPROLITIC SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65)
		R1	13'-18'	100 % 88% RQD	REC						GNEISS. MEDIUM GRAY, HARD, SLIGHTLY WEATHERED TO UNWEATHERED, OXIDATION ON JOINT TO 25', AT 41', 61.5', AND 85.5'. FOLIATION AT 60 DEGREES TO SUB-VERTICAL FROM 13' TO 30' AND BELOW 45'; AT 50 DEGREES FROM 30' TO 45'.
20											
		R2	18'-28'	100 % 88% RQD	REC						MODERATELY CLOSE JOINT SPACING FROM 13' TO 30' WITH SOME FOLIATION JOINTS AND SUB-HORIZONTAL TO 60-DEGREE JOINTS ACROSS FOLIATION,
30											
		R3	28'-38'	100 % 95% RQD	REC						
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 4
LOCATION BRONX, NY
HOLE NO MG-89-99
LINE & STA N:323,275.41
OFFSET E:624,486.52

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALT CASING OUT DATE ____

DATE START: 2-15-99
DATE FINISH: 2-16-99

GROUND ELEVATION 198.13
GROUND WATER ELEVATION 190.87 2/17/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE ____

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24 SAMPLER 30

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											OXIDIZED.
40											FROM 13' TO 13.6', A SUBVERTICAL FOLIATION JOINT, OXIDIZED, ROUGH, TIGHT.
		R4	38'-48'	100 % REC							AT 19.8', A 60-DEGREE FOLIATION JOINT, OXIDIZED, SMOOTH, TIGHT WITH A 50-DEGREE JOINT ACROSS FOLIATION, ROUGH, OPEN.
50				95% RQD							AT 21.8', A 70-DEGREE FOLIATION JOINT, SMOOTH, TIGHT, EPIDOTE, MICA WITH A 50-DEGREE JOINT WITH FOLIATION TREND, ROUGH, TIGHT, EPIDOTE.
-10											AT 24.4', A 60-DEGREE JOINT ACROSS FOLIATION, OXIDIZED, SMOOTH, TIGHT. (2-65)
		R5	48'-58'	100 % REC							MODERATELY CLOSE TO WIDE JOINT SPACING FROM 30' TO 76'. BELOW 38', 10-DEGREE JOINTS PREDOMINATE.
60				98% RQD							AT 34.5', A 60-DEGREE JOINT WITH FOLIATION TREND, SMOOTH, TIGHT.
-20											
		R6	58'-68'	100 % REC							
70				98% RQD							
-30											
		R7	68'-78'	100 % REC							
80				90% RQD							
-40											

Soil Engineer ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector ____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 4
LOCATION BRONX, NY
HOLE NO MG-89-99
LINE & STA N:323,275.41
OFFSET E:624,486.52

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-15-99
DATE FINISH 2-16-99

GROUND ELEVATION 198.13
GROUND WATER ELEVATION 190.87 2/17/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE ____

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24 SAMPLER 30

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80											AT 36.3', A 60-DE-GREE FOLIATION JOINT, SMOOTH, TIGHT, MICA. AT 59.2', A 60-DE-GREE FOLIATION JOINT, IRREGULAR, ROUGH, TIGHT. FROM 73.5' TO 74.8' A SUBVERTICAL FOLIATION JOINT, ROUGH, OPEN WITH TWO 70-DEGREE JOINTS ACROSS FOLIATION, ROUGH, TIGHT. (1-65)
90		R8	78'-88'	97% REC 74% RQD						88'	
10											
100											CLOSE TO MODERATEL CLOSE JOINT SPACIN BELOW 76'. CLOSELY JOINTED FROM 76.3' TO 78' WITH 5 TO 10-DEGREE JOINTS PREDOMINANT. FROM 81.5' TO 83', A SUBVERTICAL FOLIATION JOINT, SMOOTH, CURVED, TIGHT WITH TWO 10-DEGREE JOINTS ACROSS FOLIATION, TIGHT, ROUGH.
20											
110											FROM 85' TO 86.2', SUBVERTICAL JOINT WITH FOLIATION, OXIDIZED, ROUGH, TIGHT, WITH A 10-DEGREE JOINT ACROSS FOLIATION, ROUGH,
30											
120											
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET ___ OF ___
LOCATION BRONX, NY
HOLE NO MG-B9-99
LINE & STA. N:323,275.41
OFFSET E:624,486.52

DEPTH ___ FT ___ FT CASING OUT DATE ___
DEPTH ___ FT ALL CASING OUT DATE ___

DATE START 2-15-99
DATE FINISH 2-16-99

GROUND ELEVATION 198.13
GROUND WATER ELEVATION 190.87 2/17/99

CASING OD HW ID ___
SAMPLER OD 2" ID ___
DIAMOND BIT SIZE ___

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24 SAMPLER 30

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											TIGHY AND A VERTICAL FOLIATION JOINT, SMOOTH, TIGHT.
											FAIR TO GOOD ROCK. (3-65/2-65)
											END OF HOLE 88'
10											
20											
30											
40											

Soil Engineer: ___ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ___ Helper: ALVRO LONDON

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B10-99
LINE & STA N:323,422.92
OFFSET E:624,505.15

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-18-99
DATE FINISH 2-19-99

GROUND ELEVATION 193.13
GROUND WATER ELEVATION 186.22 2/22/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	9"	3	5	5	7		0'-2'	TOPOSIL (3"). DARK GRAY BROWN SANDY SILT, ORGANIC MATTER. STIFF. (ML) (11-65)
		SS2	2'-4'	11"	5	4	6	7			
		SS3	4'-6'	14"	11	15	17	30		8'	RUSTY BROWN SILTY SAND, TRACE TO SOM GRAVEL, SOME ROCK FRAGMENTS BELOW 6' DENSE. (SM AND GM) (6-65)
		SS4	6'-7.5'	12"	15	27	100	/6"			
10											
		R1	8'-18'	98% REC 89% RQD							GNEISS. LIGHT GRAY TO MEDIUM GRAY, SLIGHTLY WEATHERED ON UPPER 6 FEET; SLIGHTLY WEATHERED TO UNWEATHERED THE REST. SOME OXIDATION ON JOINT TO 54.2'. MODERATELY HARD TO HARD. QUARTZITIC FROM 14' TO 30.5', 36' TO 40.5'.
20											
		R2	18'-28'	100 % REC 91% RQD							FOLIATION AT 60 DEGREES TO SUB-VERTICAL. IN GENERAL, MODERATEL CLOSE JOINT SPACING.
30											
		R3	28'-38'	98% REC 93% RQD							FROM 8' TO 15', PREDOMINANT JOINTS ARE 30-DEGREE JOINTS ACROSS FOLIATION.
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B10-99
LINE & STA N:323,422.92
OFFSET E:624,505.15

DEPTH ____ FT ____ FT CASING OUT DATE: ____
DEPTH ____ FT ALL CASING OUT DATE: ____

DATE START: 2-18-99
DATE FINISH: 2-19-99

GROUND ELEVATION 193.13
GROUND WATER ELEVATION 186.22 2/22/99

CASING OD HW ____ ID ____
SAMPLER OD 2" ____ ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											FROM 15' TO 36', PREDOMINANT JOINTS ARE 60-DEGREE FOLIATION JOINTS.
		R4	38'-48'	100 %		REC					AT 26.8' AND 27.5' TWO 60-DEGREE FOLIATION JOINTS, SMOOTH, MICA.
50				100 %		RQD					AT 34', A 60-DEGREE FOLIATION JOINT STRONGLY OXIDIZED, SMOOTH.
10											
		R5	48'-58'	100 %		REC					FROM 36' TO 50', PREDOMINANT JOINTS ARE 30-DEGREE JOINTS ACROSS FOLIATION. PYRITE PRESENT THROUGHOUT
60				100 %		RQD					
20											FROM 50' TO 69', PREDOMINANT JOINTS ARE 30 TO 60-DEGRE JOINTS ALONG FOLIATION.
		R6	58'-68'	100 %		REC					AT 53.3', A 50-DEGREE FOLIATION JOINT, SMOOTH, MICA.
70				90%		RQD					AT 54.2', A 50-DEGREE FOLIATION JOINT, OXIDIZED, SMOOTH.
30											FROM 67.2' TO 68', 60-DEGREE FOLIATIO
		R7	68'-78'	96%		REC				78'	JOINT, FRIABLE, SOFT, CHLORITE.
80				88%		RQD					POSSIBLE SHEAR WIT
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B10-99
LINE & STA N:323,422.92
OFFSET E:624,505.15

DEPTH _____ FT ___ H CASING OUT DATE. _____
DEPTH _____ H ALL CASING OUT DATE. _____

DATE. START 2-18-99
DATE. FINISH 2-19-99

GROUND ELEVATION 193.13
GROUND WATER ELEVATION 186.22 2/22/99

CASING O.D. HW I.D. _____
SAMPLER O.D. 2" I.D. _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											A 30-DEGREE JOINT ACROSS FOLIATION, SMOOTH, CHLORITE. FROM 68.7' TO 69', A 60-DEGREE FOLIATION JOINT, SMOOTH, CHLORITE. BELOW 69', 20 TO 30-DEGREE JOINTS ACROSS FOLIATION PREDOMINATE. FROM 76.2' TO 77.5' A 70-DEGREE FOLIATION JOINT, SMOOTH, EPIDOTE, CHLORITE WITH A 20-DEGREE JOINT ACROSS FOLIATION, ROUGH. IN GENERAL, GOOD ROCK. (1-65) END OF HOLE 78'
10											
20											
30											
40											

Soil Engineer: _____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: _____ Helper: ALVRO LONDON

JOB LOCATION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B11-99
LINE & STA N:322,906.15
OFFSET E:624,542.71

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 3-12-99
DATE FINISH 3-16-99

GROUND ELEVATION 194.92
GROUND WATER ELEVATION ____

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER ____ IN

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	ANGLED BOREHOLE: DIRECTION N 8 DEGREES E ANGLE 60 DEGREES ROLLER BIT TO TOP OF ROCK NOTE: ALL DEPTHS SHOWN AS "DOWN-HOLE OR NON-VERTICAL
10										10'	GNEISS. MEDIUM GRAY. SCHISTOSE, AMPHIBOLITIC BANDS MODERATELY HARD TO HARD, FAIRLY WEATHERED TO UN-WEATHERED. FOLIATION VARIES FROM 50 DEGREES TO SUBVERTICAL, MOSTL AT 70 DEGREES. OXIDATION ON JOINT TO 17'.
20		R1	10'-20'	99% REC 74% RQD							FRACTURED FROM 10' TO 17'. FROM 14' T 15', AN 80-DEGREE FOLIATION JOINT, SOFT, OXIDIZED, ROUGH, OPEN. (3-65)
30		R2	20'-30'	98% REC 97% RQD							MODERATLEY CLOSE JOINT SPACING FROM 17' TO 55'. FROM 21.75' TO 22.5', A 80-DEGREE FOLIATIO JOINT, ROUGH, TIGHT.
40		R3	30'-40'	100 % REC 91% RQD							

Soil Engineer: ____ Driller: GREG MARNEY JR.

Drilling Inspector: ____ Helper: THEO RODRIGUEZ

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B11-99
LINE & STA N:322,906.15
OFFSET E:624,542.71

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START. 3-12-99
DATE. FINISH. 3-16-99

GROUND ELEVATION 194.92
GROUND WATER ELEVATION ____

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										AT 32.5', A 50-DEGREE JOINT WITH FOLIATION TREND, SMOOTH, TIGHT, ALTERATION IN EPIDOTE. FROM 48' TO 48.5', A 70-DEGREE FOLIATIOI JOINT, SMOOTH, TIGHT.
40										
50										
10	R4	40'-50'	98% REC 90% RQD							AT 51', A 30-DEGREI JOINT WITH FOLIATION TREND, SMOOTH, TIGHT. AT 52', A 30-DEGREI JOINT ACROSS FOLIATION, SMOOTH, TIGHT. AT 53', A 30-DEGREE JOINT ACROSS FOLIATION ROUGH, TIGHT, CARBONATE COATING. (2-65)
60										
20	R5	50'-60'	100 % REC 94% RQD							
70										MODERATELY CLOSE T. WIDE JOINT SPACING BELOW 55'. AT 61.8', A 60-DEGREE JOINT ACROSS FOLIATION, ROUGH, ALTERATION IN CHLORITE, CARBONAT COATING. FROM 65.5' TO 65.8', AT 70-DEGRE FOLIATION JOINT, SMOOTH, TIGHT.
30	R6	60'-70'	98% REC 85% RQD							
80	R7	70'-80'	96% REC 76% RQD							
40										

Soil Engineer: ____ Driller: GREG MARNEY JR.

Drilling Inspector: ____ Helper: THEO RODRIGUEZ

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO MG-B11-99
LINE & STA N:322,906.15
OFFSET E:624,542.71

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 3-12-99
DATE FINISH 3-16-99

GROUND ELEVATION 194.92
GROUND WATER ELEVATION ____

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											FROM 70' TO 70.8', TWO FOLIATION JOINTS AT 70 DEGREES, ROUGH, OPEN, ALTERATION IN CHLORITE. FROM 74.5' TO 75.6', AN 80-DEGREE JOINT ACROSS FOLIATION, ROUGH, OPEN, ALTERATION IN CHLORITE. FROM 84' TO 85', A 75-DEGREE FOLIATION JOINT, ROUGH, TIGHT, ALTERATION IN CHLORITE. FROM 95.2' TO 96', AN 80-DEGREE FOLIATIO JOINT, SMOOTH, SOM CARBONATE COATING. (1-65)
80											
90											
10		R8	80'-90'	98% REC 88% RQD							
100											
20		R9	90'-100'	98% REC 96% RQD							
		R10	100'-105'	100 % REC 100 % RQD						105'	
110											END OF HOLE 105'
30											
120											
40											

Soil Engineer: ____ Driller: GREG MARNEY JR.

Drilling Inspector: ____ Helper: THEO RODRIGUEZ

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B12-99
LINE & STA N:323,064.12
OFFSET E:624,562.82

DEPTH ____ FT ____ FT CASING OUT DATE. ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-16-99
DATE. FINISH 2-17-99

GROUND ELEVATION 195.19
GROUND WATER ELEVATION 186.39 2/22/99

CASING O.D. HW ID ____
SAMPLER O.D. 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
	SS1	0'-2'	12"	2	2	3	4		0'- 2'	TOPSOIL (4"). DARK GRAY SILTY SAND, ORGANIC MATTER. LOOSE TO MEDIUM DENSE. (SM) (11-65)
	SS2	2'-4'	14"	3	4	6	6			
	SS3	4'-6'	15"	6	8	10	11			
	SS4	6'-6.7'	4"	63	100	/2"			7'	RUSTY BROWN SILTY FINE SAND, TRACE T SOME GRAVEL. MEDIU DENSE. (SM) (6-65)
	SS5	8'-8.2'	2"	100	/3"					
									12'	TAN BROWN SILTY F- SAND WITH MICA, ROC FRAGMENTS (GNEISS) COBBLES. VERY DENSE. POSSIBLY SAPROLITIC SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65) ROLLER BIT FROM 8.2' TO TOP OF ROC
	R1	12'-17'	100 %	REC						
			50%	RQD						
	R2	17'-24.5'	96%	REC						GNEISS. MEDIUM GRAY MODERATELY HARD TO HARD, MODERATELY WEATHERED TO UN- WEATHERED. OXIDATIO ON JOINTS TO 26.5' QUARTZITIC BANDS FROM 12' TO 14'; 26' TO 27.5'. FOLIATION AT 70 DEGREES TO SUB- VERTICAL AND AT 50 DEGREES FROM 40' T 55' AND 65' TO 71'
			49%	RQD						
	R3	24.5'-32'	100 %	REC						FRACTURED AND OXIDIZED FROM 12' T 14.5' AND FROM 17' TO 24.5', WITH CLOSELY SPACED
			93%	RQD						

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B12-99
LINE & STA N:323,064.12
OFFSET E:624,562.82

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-16-99
DATE FINISH 2-17-99

GROUND ELEVATION 195.19
GROUND WATER ELEVATION 186.39 2/22/99

CASING OD HW I.D ____
SAMPLER OD 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											JOINTS.
		R4	32'-42'	100 %	REC						FOLIATION JOINTS PREDOMINATE TO 14.5', SUBHORIZONTAL JOINTS PREDOMINATE FROM 14.5' TO 27'. FROM 23.5' TO 24,2' A 70-DEGREE FOLIATION JOINT, OXIDIZED, SMOOTH, OPEN WITH TWO 5 TO 10-DEGREE JOINTS, OPEN, ROUGH. (3-65) ROCK QUALITY IMPROVES BELOW 27', UNWEATHERED, MODERATELY CLOSE TO WIDE JOINT SPACING
				95% RQD							
50											
10		R5	42'-52'	100 %	REC						
				93% RQD							
60											
20		R6	52'-62'	100 %	REC						AT 46.5', AN 80-DEGREE FOLIATION JOINT, SMOOTH, TIGHT, CHLORITE.
				98% RQD							
70											AT 75.7', A 60-DEGREE FOLIATION JOINT, ROUGH, OPEN AND A 60-DEGREE JOINT ACROSS FOLIATION, SMOOTH, OPEN.
30		R7	62'-71'	98% REC							AT 76.9', A 60-DEGREE FOLIATION JOINT, ROUGH, TIGHT.
				98% RQD							
80											
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO MG-B12-99
LINE & STA. N:323,064.12
OFFSET E:624,562.82

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE START: 2-16-99
DATE FINISH 2-17-99

GROUND ELEVATION 195.19
GROUND WATER ELEVATION 186.39 2/22/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		R8	71'-81.5'	96% REC						81.5'	AT 77.5', A 60-DEGREE JOINT WITH FOLIATION TREND, SMOOTH, TIGHT, CHLORITE. AT 77.8', A 40-DEGREE JOINT WITH FOLIATION TREND, ROUGH, TIGHT. AT 79.2', A 60-DEGREE JOINT WITH FOLIATION TREND, SMOOTH, CHLORITE, EPIDOTE, TIGHT. FROM 81' TO 81.5', A SUBVERTICAL FOLIATION JOINT, SMOOTH, TIGHT. (1-65)
80				86% RQD							
90											END OF HOLE 81.5'
10											
100											
20											
110											
30											
120											
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B13-99
LINE & STA N:323,264.15
OFFSET E:624,587.04

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-10-99
DATE FINISH 2-11-99

GROUND ELEVATION 195.97
GROUND WATER ELEVATION 186.81 2/15/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV ' FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	12"	4	4	3	2		0'-2'	TOPSOIL (4"). DARK BROWN SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	14"	7	5	6	7			
		SS3	4'-6'	4"	11	15	49	60		7'	RUSTY BROWN SILTY FINE SAND, TRACE FINE TO MEDIUM GRAVEL. MEDIUM DENSE TO VERY DENSE. (SM) (7-65)
10		R1	7'-13'	100 % REC 98% RQD							GNEISS. MEDIUM GRAY, HARD, GENERALLY UNWEATHERED. OXIDATION ON JOINT TO 42'.
20		R2	13'-23'	98% REC 94% RQD							FOLIATION AT 60 TO 80 DEGREES FROM 7' TO 30'; AT 20 TO 50 DEGREES FROM 30' TO 40' AN 50' TO 60'; AT 70 DEGREES TO SUBVERTICAL FROM 40' TO 50' AND BELOW 60'.
30		R3	23'-33'	100 % REC 88% RQD							IN GENERAL, MODERATELY CLOSE T WIDE FRACTURE SPACING; MODERATELY CLOSE TO CLOSE FROM 40' TO 50'. SUBHORIZONTAL JOINTS PREDOMINATE
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B13-99
LINE & STA N:323,264.15
OFFSET E:624,587.04

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-10-99
DATE. FINISH 2-11-99

GROUND ELEVATION 195.97
GROUND WATER ELEVATION 186.81 2/15/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40		R4	33'-43'	100 %	REC						AT 19', A 60-DEGRE FOLIATION JOINT, OXIDIZED, ROUGH, TIGHT. AT 28.5', A 60-DEGREE JOINT ACROSS THE FOLIATION, OXIDIZED, ROUGH, TIGHT. AT 43', AT 60-DEGRE JOINT WITH FOLIATION TREND, ROUGH, TIGHT, CHLORITE ALTERATION. AT 45' A 60-DEGREE FOLIATION JOINT, ROUGH, IRREGULAR, TIGHT. FROM 43' TO 45', ROCK IS JOINTED WITH JOINT 7" APART. GOOD ROCK BELOW 45'. FROM 76' TO 77.5', A SUB-VERTICAL JOINT ACROSS FOLIATION, IRREGULAR, TIGHT, ROUGH. (1-65)
				95% RQD							
50											
10											
		R5	43'-53'	100 %	REC						
				83% RQD							
60											
20											
		R6	53'-63'	100 %	REC						
				91% RQD							
70											
30											
		R7	63'-73'	99% REC							
				95% RQD							
80											
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION: BRONX, NY
HOLE NO MG-B13-99
LINE & STA N:323,264.15
OFFSET E:624,587.04

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-10-99
DATE FINISH: 2-11-99

GROUND ELEVATION 195.97
GROUND WATER ELEVATION 186.81 2/15/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80		R8	73'-83'	98% REC 88% RQD						83'	
90											END OF HOLE 83'
10											
100											
20											
110											
30											
120											
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B14-99
LINE & STA. N:323,436.44
OFFSET E:624,605.98

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START 3-1-99
DATE. FINISH 3-3-99

GROUND ELEVATION 190.53
GROUND WATER ELEVATION ____

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300 LBS.
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	ANGLED BOREHOLE DIRECTION: S 8 DEGREES W ANGLE: 60 DEGREES. NOTE: ALL DEPTHS SHOWN AS "DOWN-HOLE" OR NON-VERTICAL)
10		R1	9'-15'	93% REC 82% RQD						9'	GNEISS. LIGHT TO MEDIUM GRAY. QUARTZITIC FROM 15 TO 18.5', 58' TO 61', 80' TO 86', 90.5' TO 91.5' (BAND); BIOTITE GNEISS FROM 74.5' TO 80'. FOLIATION VARIABLE FROM 40 DEGREES TO VERTICAL. OXIDATION ON JOINT TO 32'.
20		R2	15'-25'	91% REC 83% RQD							FROM 15' TO 29' AN 35' TO 45', 20 TO 30 AND 60-DEGREE JOINTS ACROSS FOLIATION ARE PREDOMINANT, ROUGH, OXIDIZED, TIGHT. AT 26.5', A 60-DEGREE FOLIATION JOINT, ROUGH, TIGHT
30		R3	25'-35'	100 % REC 90% RQD							CLOSELY JOINTED FROM 23' TO 27.5'; MODERATELY JOINTED FROM 9' TO 23' AND 27.5' TO 98.5'.
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.

SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B14-99
LINE & STA N:323,436.44
OFFSET E:624,605.98

DEPTH _____ FT ____ FT CASING OUT DATE: _____
DEPTH _____ FT ALL CASING OUT DATE _____

DATE. START: 3-1-99
DATE. FINISH 3-3-99

GROUND ELEVATION 190.53
GROUND WATER ELEVATION _____

CASING O.D HW I.D _____
SAMPLER O.D 2" I.D. _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300 LBS.
INSIDE LENGTH OF SAMPLER _____ IN.

HAMMER FALL
CASING _____ SAMPLER _____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											
		R4	35'-45'	100 %	REC						
				99%	RQD						
50											
10											
		R5	45'-55'	96%	REC						
				76%	RQD						
60											
20											
		R6	55'-65'	98%	REC						
				95%	RQD						
70											
30											
		R7	65'-75'	100 %	REC						
				82%	RQD						
80											
40											

AT 30.1', 32', 32.8', 43' AND 46.3', 60-DEGREE FOLIATION JOINTS, ROUGH, OXIDIZED, TIGHT.
AT 31.25', A 20-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT.
AT 45.25', A SUB-VERTICAL JOINT ACROSS FOLIATION, IRREGULAR, ROUGH, CARBONATE COATING, OPEN.
AT 48.7', A 50-DEGREE JOINT ACROSS FOLIATION, SMOOTH, TIGHT, EPIDOTE, CARBONATE COATING.
FROM 54.5'TO 55.5' TWO FOLIATION JOINTS, SMOOTH, TIGHT.
AT 58.8', A 40-DEGREE JOINT ACROSS FOLATION, SMOOTH, TIGHT.
FROM 68'TO 68.2', SOFT, FRIABLE, ALONG A 40-DEGREE JOINT ACROSS FOLIATION OPEN.
CLOSELY JOINTED FROM 98.5' TO 105'

Soil Engineer: _____ Driller: GREG MARNEY

Drilling Inspector: _____ Helper: GREG WILLIAMS

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO MG-B14-99
LINE & STA. N:323,436.44
OFFSET E:624,605.98

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 3-1-99
DATE FINISH 3-3-99

GROUND ELEVATION 190.53
GROUND WATER ELEVATION ____

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300 LBS.
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80											
		R8	75'-85'	99% REC 97% RQD							
90											
-10											
		R9	85'-95'	100 % REC 100 % RQD							
100											
-20											
		R10	95'-105'	100 % REC 70% RQD						105'	
110											
-30											
120											
-40											

AT 92' AND 93.5', TWO FOLIATION JOINTS AT 60 DEGREES, CHLORITIC ALTERATION, TIGHT.
AT 103', A 70-DEGREE FOLIATION JOINT, SMOOTH, TIGHT.
AT 104.5', A SUB-VERTICAL JOINT WITH FOLIATION TREND, IRREGULAR, ROUGH, OPEN, CARBONATE COATING. (2-65)

END OF HOLE 105'

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED 543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN & SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B15-99
LINE & STA N:322,903.09
OFFSET E:624,644.07

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE: ____

DATE START 2-10-99
DATE FINISH 2-11-99

GROUND ELEVATION 195.56
GROUND WATER ELEVATION 187.14 2/15/99

CASING O.D. HW ____ I.D. ____
SAMPLER O.D. 2" ____ I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	18"	3	2	2	2		0'-	TOPSOIL (4"). RUST
		SS2	2'-4'	18"	3	4	3	4		4'	BROWN SILTY SAND, ORGANIC MATTER FRO 0' TO 2' (11-65). LOOSE FROM 2' TO 4'. (SM) (7-65)
		SS3	4'-6'	18"	7	12	12	15			
		SS4	6'-6.7'	6"	19	100	/1"				RUSTY BROWN SILTY SAND, TRACE GRAVEL TO 9', WITH ROCK FRAGMENTS BELOW 9'.
10		SS5	8'-10'	12"	12	38	100	/2"	WASH	11'	MEDIUM DENSE TO DENSE. (SM) (6-65)
20		R1	11'-21'	99% REC 77% RQD							GNEISS. MEDIUM GRAY, MODERATELY HARD TO HARD. QUARTZITIC BANDS, SLIGHTLY WEATHERED FROM 11' TO 19'. OXIDATION ON JOINTS TO 17.5'. FOLIATION AT 70 DEGREES TO SUBVERTICAL FROM 11' TO 21' AND BELO 69'; AT 45 DEGREES FROM 33' TO 40'; INDISTINCT FROM 21 TO 33', 40' TO 69'.
30		R2	21'-31'	99% REC 92% RQD							CLOSE TO MODERATEL CLOSE JOINT SPACIN FROM 11' TO 19'. SOME OXIDATION ON FOLIATION AND SUB-HORIZONTAL JOINTS. SHEARING ALONG A SUBHORIZONTAL JOIN FROM 12.5' TO 13' WITH CHLORITE AND HEMATITE STAINING
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED 543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN & SAWYER

SHEET ~ OF ~
LOCATION BRONX, NY
HOLE NO MG-B15-99
LINE & STA. N:322,903.09
E:624,644.07
OFFSET

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START 2-10-99
DATE. FINISH 2-11-99

GROUND ELEVATION 195.56
GROUND WATER ELEVATION 187.14 2/15/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40		R3	31'-41'	99% REC 93% RQD							AND PITTED CORE SURFACE. FROM 13' TO 14', A 75-DEGREE JOINT ACROSS FOLIATION, OXIDIZED. (2-65) MODERATELY CLOSE TO WIDE JOINT SPACING BELOW 19'. IN GENERAL, THE ROCK IS VERY GOOD BELOW 19'. (1-65)
50											
10		R4	41'-51'	99% REC 99% RQD							
60											
20		R5	51'-61'	99% REC 98% RQD							
70											
30		R6	61'-71'	99% REC 98% RQD							
80											
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED 543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN & SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO MG-B15-99
LINE & STA N:322,903.09
OFFSET E:624,644.07

DEPTH ____ FT ____ FT CASING OUT DATE. ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE, START 2-10-99
DATE, FINISH 2-11-99

GROUND ELEVATION 195.56
GROUND WATER ELEVATION 187.14 2/15/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		R7	71'-81'	99% REC						81'	
80				98% RQD							END OF HOLE 81'
90											
10											
100											
20											
110											
30											
120											
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCAION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.

SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B16-99
LINE & STA. N:323,151.70
OFFSET E:624,674.92

DEPTH ____ FT ____ FT CASING OUT DATE: ____
DEPTH ____ FT ALL CASING OUT DATE. ____

DATE. START: 2-8-99
DATE. FINISH: 2-9-99

GROUND ELEVATION 194.87
GROUND WATER ELEVATION 183.19 2/10/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV · FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	TOPSOIL (6"). DARK
		SS1	0'-2'	12"	2	3	3	4		2'	BROWN SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	14"	4	7	8	8			
		SS3	4'-6'	10"	9	11	27	100/4"			RUSTY BROWN SILTY SAND, TRACE GRAVEL TO 4', SOME GRAVEL
		SS4	6'-8'	10"	8	17	21	24		8'	FROM 4' TO 8'. MEDIUM DENSE TO
		SS5	8'-8.3'	3"	100/4"						DENSE. (SM) (6-65)
10										9.5'	YELLOW BROWN SILTY F-M SAND WITH MICA ROCK FRAGMENTS. VERY DENSE. POSSIBLE SAPROLITI SOIL(DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
20		R1	10'-20'	90% REC 60% RQD							GNEISS. MEDIUM GR MODERATELY HARD TO HARD. FOLIATION AT 70 DEGREES TO SUB-VERTICAL.
30		R2	20'-30'	98% REC 96% RQD							MODERATELY WEATHERED TO 15.5' WITH SOME OXIDATIO ON FOLIATION AND SUBHORIZONTAL JOINTS. PITTED COR SURFACE FROM 11' 25'. (3-65)
40		R4	30'-40'	99% REC 95% RQD							

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B16-99
LINE & STA N:323,151.70
OFFSET E:624,674.92

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-8-99
DATE FINISH: 2-9-99

GROUND ELEVATION 194.87
GROUND WATER ELEVATION 183.19 2/10/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											
50											
10		R4	40'-50'	99% REC 99% RQD							
60											
20		R5	50'-60'	99% REC 97% RQD							
70											
30		R6	60'-70'	99% REC 97% RQD							
80		R7	70'-80'	99% REC 92% RQD						80'	END OF HOLE 80'
40											

ROCK QUALITY IMPROVES BELOW 15.5'. MODERATELY CLOSE TO WIDE JOIN SPACING. A FEW SUB HORIZONTAL JOINTS ACROSS FOLIATION. GOOD ROCK. (1-65)

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B17-99
LINE & STA N:323,420.47
OFFSET E:624,708.49

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE. ____

DATE. START 2-25-99
DATE. FINISH 3-2-99

GROUND ELEVATION 192.33
GROUND WATER ELEVATION 185.54 3/24/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	18"	9	10	27	54		0'-2'	DARK BROWN SILTY F-M SAND AND DARK SILTY SAND WITH SILT, ORGANIC MATTER. (SM) (11-65
		SS2	2'-	6"	64	100	/5"			4'	DARK GRAY SILTY F-C SAND, MICA, COBBLES, ROCK FRAGMENTS. VERY DENSE. POSSIBLE SAPROLITIC SOIL. (SM AND GM) (6-65)
10		R1	4'-14'	97% REC 77% RQD							GNEISS. MEDIUM GRAY, MODERATELY HARD TO HARD, QUARTZITIC FROM 42 TO 52'. FAINTLY WEATHERED TO UN-WEATHERED. FOLIATION VARIES FROM 75 TO 85 DEGREES FROM 4' TO 10'; 50 DEGREES FROM 10' TO 14'; 30 TO 60 DEGREES FROM 14' TO 19'; 40 DEGREES FROM 19 TO 24'; 30 TO 70 DEGREES FROM 26' TO 42'; 50 TO 80 DEGREES FROM 52' T 70.5'; INDISTINCT FOLIATION FROM 42' TO 52' AND BELOW 70.5'.
20		R2	14'-24'	100 % REC 77% RQD							
30		R3	24'-34'	98% REC 93% RQD							
40											OXIDATION ON JOIN TO 18'.

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L. 99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 4 OF 3
LOCATION BRONX, NY
HOLE NO MG-B17-99
LINE & STA N:323,420.47
OFFSET E:624,708.49

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE. START: 2-25-99
DATE. FINISH. 3-2-99

GROUND ELEVATION 192.33
GROUND WATER ELEVATION 185.54 3/24/99

CASING O.D. HW ID ____
SAMPLER O.D. 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											
		R4	34'-44'	98% REC							MODERATELY CLOSE TO CLOSE JOINT SPACING FROM 4' TO 19' WITH SEVERAL OPEN JOINTS, OXIDIZED, MOSTLY ROUGH. CLOSE TO WIDE JOINT SPACING BELOW 19'.
				95% RQD							
50											
10											
		R5	44'-54'	100 % REC							FROM 10' TO 12.25', IRREGULAR FOLIATION JOINT AT 75 DEGREES TO VERTICAL TO 50 DEGREES, OXIDIZED, OPEN, ROUGH. AT 15.3', A 60-DEGREE JOINT ACROSS FOLIATION, OXIDIZED, ALTERED IN CHLORITE AND COATED WITH CARBONATE, SMOOTH. (2-65) ROCK CLASS FROM 4' TO 19'.
				98% RQD							
60											
20											
		R6	54'-64'	99% REC							AT 19' TO 20.1', TWO FOLIATION JOINTS AT 40 DEGREES, SMOOTH, TIGHT. AT 24.2', 24.9', 40 AND 60-DEGREE JOINTS, SMOOTH, TIGHT, WITH EPIDOTE ALTERATION AND CARBONATE COATING. AT 39.7', A 20-DEGREE JOINT ACROSS FOLIATION, SMOOTH, TIGHT, WITH
				99% RQD							
70											
30											
		R7	64'-74'	100 % REC						74'	
				97% RQD							
80											
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO MG-B17-99
LINE & STA N:323,420.47
OFFSET E:624,708.49

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT. ALL CASING OUT DATE ____

DATE. START: 2-25-99
DATE. FINISH: 3-2-99

GROUND ELEVATION 192.33
GROUND WATER ELEVATION 185.54 3/24/99

CASING O.D. HW I.D ____
SAMPLER O.D. 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											CHLORITE AND EPIDOTE ALTERATION AT 43', A 10-DEGRE JOINT, SMOOTH, OPEN AT 51.3', A 50-DEGREE JOINT, SMOOTH, TIGHT, WIT CARBONATE COATING. AT 53', A 10-DEGRE JOINT, SMOOTH, TIGHT, WITH CARBONATE COATING. AT 67', A 50-DEGRE FOLIATION JOINT, SMOOTH, TIGHT.
10											ROCK BELOW 19' IS GENERALLY GOOD, MASSIVE. (1-65)
20											END OF HOLE 74'
30											ORIENTED CORE FROM 15' TO 74'. WATER PRESSURE TESTS IN ROCK FROM 5' TO 74'. PIEZOMETER INSTALLED AT 68.5'.
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B18-99
LINE & STA N:322,893.84
OFFSET E:624,742.15

DEPTH _____ ft ___ ft CASING OUT DATE _____
DEPTH _____ ft ALL CASING OUT DATE _____

DATE START: 2-26-99
DATE FINISH: 3-2-99

GROUND ELEVATION 194.72
GROUND WATER ELEVATION 185.86 3/22/99

CASING O.D HW ID _____
SAMPLER O.D 2" ID _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	DARK BROWN SILTY
		SS1	0'-2'	12"	3	3	4	4		3'	FINE SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	9"	4	5	6	6			
		SS3	4'-6'	7"	3	3	4	9		6'	BROWN TO YELLOW BROWN SILTY F-M SAND. MEDIUM DENSE (SM) (7-65)
		SS4	6'-8'	3"	15	19	23	35			
10		SS5	8'-10'	6"	9	11	27	31			BROWN SILTY F-M SAND WITH SOME GRAVEL. DENSE. (SM) (6-65)
										15'	
											GNEISS. MEDIUM GRAY, HARD. QUARTZITIC BANDS FROM 69.5' TO 75.5'. SLIGHTLY WEATHERED TO UN-WEATHERED. FOLIATION AT 70-DEGREE TO SUB-VERTICAL FROM 15' TO 40', 70' TO 80'; AT 30 TO 50 DEGREE FROM 40' TO 70'.
20		R1	15'-20'	95% REC 60% RQD							
30		R2	20'-30'	100 % REC 63% RQD							OXIDATION ON JOINT TO 26.3'. CLOSE TO MODERATELY CLOSE JOINT SPACING. NUMEROUS SUB-HORIZONTAL JOINTS ACROSS FOLIATON, MOSTLY ROUGH. BELO 40', 40 TO 80 DE-GREE JOINTS (FOLIA TION) AND ACROSS
40		R3	30'-40'	99% REC 83% RQD							

Soil Engineer: _____ Driller: JAKE HARRIS

Drilling Inspector: _____ Helper: DAVE HARRIS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L. 99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B18-99
LINE & STA N:322,893.84
OFFSET E:624,742.15

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT. ALL CASING OUT DATE ____

DATE. START: 2-26-99
DATE. FINISH: 3-2-99

GROUND ELEVATION 194.72
GROUND WATER ELEVATION 185.86 3/24/99

CASING O.D HW I.D. ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											FOLIATION) PRE-
40											DOMINATE ABOVE 40'
											FROM 15' TO 18',
											WEATHERED SUB-
											VERTICAL FOLIATION
											JOINTS, SLIGHTLY
											OXIDIZED, ROUGH,
50											OPEN.
10		R4	40'-50'	98% REC							AT 25.6', A 50-
				66% RQD							DEGREE JOINT WITH
											FOLIATION TREND,
											SMOOTH, OPEN,
											ALTERATION IN
											CHLORIDE, CARBONATI
											COATING. AT 42.1',
											45.7', 49.6',
											59.9' (OPEN) 60.1',
60											40 TO 50-DEGREE
20		R5	50'-60'	100 % REC							FOLIATION JOINTS,
				85% RQD							SMOOTH, TIGHT
											ALTERATION IN
											CHLORITE. AT 68.3'
											A 50-DEGREE
											FOLIATION JOINT,
											SMOOTH, OPEN.
70											
30		R6	60'-70'	99% REC							FROM 72' TO 73', A
				94% RQD							SUBVERTICAL JOINT
											ACROSS FOLIATION,
											TIGHT, ROUGH.
											FROM 78.75' TO
											79.25', A 70-
											DEGREE SMOOTH
											FOLIATION JOINT,
											ALTERATION IN
											CHLORITE.
80		R7	70'-80'	100 % REC							FAIR ROCK FROM 15'
40				88% RQD						80'	TO 26.5' AND

Soil Engineer: ____ Driller: JAKE HARRIS

Drilling Inspector: ____ Helper: DAVE HARRIS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET ___ OF ___
LOCATION BRONX, NY
HOLE NO MG-B18-99
LINE & STA N:322,893.84
OFFSET E:624,742.15

DEPTH ___ FT ___ FT. CASNG OUT DATE ___
DEPTH ___ FT ALL CASING OUT DATE ___

DATE. START: 2-26-99
DATE. FINISH: 3-2-99

GROUND ELEVATION 194.72
GROUND WATER ELEVATION 185.86 3/24/99

CASING O.D HW ___ I.D ___
SAMPLER O.D 2" ___ I.D ___
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV . FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0 - 6	6 - 12	12 - 18	18 - 24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											42' TO 50'. (2-65)
											ROCK QUALITY IMPROVES BELOW 50' (1-65)
10											END OF HOLE 80'
											ORIENTED CORE FROM 20' TO 80'.
											WATER PRESSURE TESTS IN ROCK FROM 20' TO 80'.
											PIEZOMETER INSTALLED AT 12'.
20											
30											
40											

Soil Engineer: ___ Driller: JAKE HARRIS

Drilling Inspector: ___ Helper: DAVE HARRIS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B19-99
LINE & STA N:323,040.23
OFFSET E:624,760.57

DEPTH ____ FT ____ FT. CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____
DATE START: 2-12-99
DATE FINISH 2-15-99
GROUND ELEVATION 195.57
GROUND WATER ELEVATION 184.17 2/17/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ
WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.
HAMMER FALL CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	TOPSOIL (3"). DARK
		SS1	0'-2'	12"	2	2	2	3		2'	BROWN SILTY SAND, ORGANIC MATTER.
		SS2	2'-4'	14"	2	4	4	5			LOOSE. (SM) (11-65)
		SS3	4'-6'	8"	58	31	29	24			RUSTY BROWN SILTY SAND, TRACE TO SOM GRAVEL, TRACE
		SS4	6'-8'	6"	21	24	27	30		8.5'	COBBLES. LOOSE TO VERY DENSE. (SM) (6-65)
10											
											GNEISS. MEDIUM GRAY, GENERALLY WEATHERED. FOLIATION AT 60 DEGREES TO SUB-VERTICAL. OXIDATIO ON JOINTS TO 18.5'
		R1	8.5'-18.5'	57% REC 27% RQD							
20											FRACTURED AND OXIDIZED FROM 8.5' TO 13.1'. FROM 12.7' TO 13.1', A 75-DEGREE FOLIATIO JOINT, SMOOTH, TIGHT, OXIDIZED. (4-65/3-65)
		R2	18.5'-28'	100 % REC 86% RQD							
30											
		R3	28'-38'	97% REC 78% RQD							
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B19-99
LINE & STA N:323,040.23
OFFSET E:624,760.57

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-12-99
DATE. FINISH: 2-15-99

GROUND ELEVATION 195.57
GROUND WATER ELEVATION 184.17 2/17/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											ROCK QUALITY IMPROVES BELOW 18.5'. HARD MODERATELY TO SLIGHTLY WEATHERED CLOSE TO MODERATEL JOINT SPACING FROM 18.5' TO 48', MODERATELY CLOSE SPACING FROM 48' TO 63.3' AND BELOW 65.5'; CLOSE SPACING FROM 63.3' TO 65.5'.
		R4	38'-48'	95% REC 77% RQD							
50											
10											
		R5	48'-55'	100 % REC 86% RQD							
60											
20											
		R6	55'-63.5'	100 % REC 97% RQD							
70											
30											
		R7	63.5'-73.5'	98% REC 93% RQD							
80											
40											

FROM 21.3' TO 22', A 75-DEGREE FOLIATION JOINT, ROUGH, TIGHT.
FROM 28.5' TO 29', A SUBVERTICAL FOLIATION JOINT, ROUGH, IRREGULAR, BIOTITE.
FROM 31.2' TO 32', A SUBVERTICAL JOIN WITH FOLIATION TREND, ROUGH, TIGHT, CARBONATE COATING.
FROM 46.9' TO 48', A SUBVERTICAL JOINT, ROUGH, IRREGULAR, CHLORIT ALTERATION.
FROM 52' TO 52.6', TWO FOLIATION JOINTS, CURVED, SMOOTH, CHLORITE

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B19-99
LINE & STA. N:323,040.23
OFFSET E:624,760.57

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALT CASING OUT DATE ____

DATE. START: 2-12-99
DATE. FINISH: 2-15-99

GROUND ELEVATION 195.57
GROUND WATER ELEVATION 184.17 2/17/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80											
		R8	73.5'-83.5'	97% REC 95% RQD						83.5'	ALTERATION. FROM 64' TO 64.5', A SUBVERTICAL FOLIATION JOINT, SMOOTH, CHLORITE ALTERATION, WITH TWO 10 DEGREE JOINTS ACROSS FOLIATION, ROUGH, CHLORITE ALTERATIO FAIR ROCK FROM 13.1' TO 18.5' (3-65); GOOD ROCK FROM 18.5' TO 65.5 (2-65); VERY GOOD ROCK BELOW 65.5'. (1-65)
90											
10											
100											END OF HOLE 83.5'
20											
110											
30											
120											
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN & SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B20-99
LINE & STA N:323,238.98
OFFSET E:624,765.45

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-5-99
DATE. FINISH: 2-8-99

GROUND ELEVATION 190.94
GROUND WATER ELEVATION 185.23 2/9/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	12"	7	5	5	4		0'-2'	TOPSOIL (3"). DARK GRAY SILTY SAND, ORGANIC MATTER, LOOSE. (SM) (11-65)
		SS2	2'-4'	12"	7	6	5	4			
		SS3	4'-6'	10"	4	4	3	5			RUSTY BROWN SILTY FINE SAND. LOOSE T 6'. DENSE BELOW 6'
		SS4	6'-6'8"	5"/2	7	100	/2"			8'	(SM) (7-65)
10											
		R1	8'-18'	83% REC 73% RQD							GNEISS. LIGHT TO MEDIUM GRAY. MODERATELY HARD TO HARD. SOME QUARTZITIC BANDS. MODERATELY WEATHERED TO 14', SLIGHTLY WEATHERED TO UNWEATHERED ON THE REST OF THE CORE. OXIDATION ON JOINTS TO 16.5'. FOLIATION AT 40 DEGREES TO SUB-VERTICAL; GENERALL AT 60 DEGREES.
20											
		R2	18'-28'	94% REC 88% RQD							
30											
		R3	28'-38'	99% REC 95% RQD							
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN & SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B20-99
LINE & STA N:323,238.98
OFFSET E:624,765.45

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-5-99
DATE FINISH: 2-8-99

GROUND ELEVATION 190.94
GROUND WATER ELEVATION 185.23 2/19/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											CLOSE TO MODERATEL CLOSE JOINT SPACIN TO 14'. FROM 13' T 13.8', FRIABLE, OXIDIZED, FRACTURED, A FOLIATION JOINT WITH A SUBHORIZONT AL JOINT. (3-65)
		R4	38'-48'	98% REC							
50				97% RQD							
10											MODERATELY CLOSE JOINT SPACING BELC 14', MOSTLY SUB-HORIZONTAL JOINTS. IN GENERAL, GOOD ROCK BELOW 14'.
		R5	48'-58'	95% REC							
60				93% RQD							AT 49', A 40-DEGRE JOINT WITH FOLIATION TREND, ROUGH, ALTERED IN EPIDOTE, TIGHT. AT 54.5', A 60-DE-GREE FOLIATION JOINT, ROUGH, TIGHT. (1-65)
20											
		R6	58'-68'	98% REC							
70				97% RQD							
30											
		R7	68'-78'	99% REC							
80				98% RQD						78'	
40											END OF HOLE 78'

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB-LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B21-99
LINE & STA. N:323,387.65
OFFSET E:624,803.10

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-22-99
DATE FINISH: 2-24-99

GROUND ELEVATION 190.53
GROUND WATER ELEVATION 185.11 2/26/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	3"	4	3	5	7		0'-	TOPSOIL (3"). DARK
		SS2	2'-3'	5"	7	48	100	/0"		2'	BROWN GRAY SILTY SAND, ORGANIC MATTER. (SM)(11-65
										3'	RUSTY BROWN SILTY FINE SAND, TRACE GRAVEL. (SM) (7-65)
10		R1	3'-13'	99% REC 75% RQD							GNEISS. LIGHT TO MEDIUM GRAY, OXIDIZED ON JOINTS TO 30.5' FOLIATION FROM 60 DEGREES TO SUBVERTICAL. FROM 3' TO 11', 75 DEGREE FOLIATION JOINTS, OXIDIZED. ROCK QUALITY IM- PROVES FROM 11'. SOME 60-DEGREE FOLIATION JOINTS AND SUBHORIZONTAL JOINTS FROM 24'TO 39'.
20		R2	13'-23'	100 % REC 90% RQD							IN GENERAL ROCK I CLOSELY JOINTED FROM 33' TO 35'. A SUBVERTICAL JOIN FROM 41.5' TO 42' AND A SUBHORIZONTA JOINT AT 41.5' WI CHLORITIC ALTERATION. (2-65)
30		R3	23'-33'	100 % REC 81% RQD							
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B21-99
LINE & STA. N:323,387.65
OFFSET E:624,803.10

DEPTH ____ FT. ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-22-99
DATE FINISH: 2-24-99

GROUND ELEVATION 190.53
GROUND WATER ELEVATION 185.11 2/24/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV · FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40		R4	33'-43'	99% REC 80% RQD							ROCK BECOMES MODERATELY JOINTED TO MASSIVE FROM 43' TO 63'. (1-65) VERTICAL JOINT FRO 64' TO 66'. MODERATELY CLOSE JOINT SPACING BELO 66'. (2-65)
50 -10											
		R5	43'-53'	99% REC 94% RQD							
60 -20											
		R6	53'-63'	99% REC 96% RQD							
70 -30											
		R7	63'-72'	99% REC 77% RQD						72'	END OF HOLE 72'
80 -40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B22-99
LINE & STA N:322,879.17
OFFSET E:624,842.21

DEPTH ____ FT ____ FT CASING OUT DATE: ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-9-99
DATE FINISH: 2-10-99

GROUND ELEVATION 193.22
GROUND WATER ELEVATION 179.11
2/11/99

CASING OD HW ID ____
SAMPLER OD 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	18"	4	3	2	2		0'-2'	TOPSOIL (5"). RUST BROWN SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	18"	2	2	3	4			
		SS3	4'-6'	18"	3	4	4	5			RUSTY BROWN SILTY FINE TO MEDIUM SAND, TRACE OF
		SS4	6'-8'	18"	5	7	7	8		8'	GRAVEL FROM 5' TO 8'. LOOSE TO MEDIU DENSE. (SM) (7-65)
		SS5	8'-9'	12"	14	100	/6"				
10		SS6	10'-10.4'	5"	100	/5"					BELOW 8', GREENISH GRAY SILTY SAND, SOME TO LITTLE GRAVEL, COBBLES. DENSE. TILL
		SS7	15'-15.2'	3"	100	/3"				17'	MATERIAL. (SM AND GM) (6-65)
20		SS8	20'-22'	10"	25	38	40	40			TAN BROWN SILTY F-SAND WITH ROCK FRAGMENTS (GNEISS) MICA, COBBLES, PROBABLE BOULDERS. VERY DENSE.
		SS9	25'-26.2'	12"	57	61	100	/3"			POSSIBLE SAPROLITI SOIL (DECOMPOSED
30										28'	ROCK). (SM AND GM) (6-65/5-65)
		R1	28'-33'	90% REC 33% RQD							GNEISS. OXIDATION ON JOINTS TO 39.5' AND 55'. OXIDIZED, FRACTURED, SOFT TO MODERATELY HARD, FRIABLE FROM 28' T 31', WITH FOLIATIO AT 40 DEGREES. (4-65/3-65)
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B22-99
LINE & STA. N:322,879.17
OFFSET E:624,842.21

DEPTH ____ ft. ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE. ____

DATE START: 2-9-99
DATE FINISH: 2-10-99

GROUND ELEVATION 193.22
GROUND WATER ELEVATION 179.11 2/10/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40		R2	33'-43'	80% REC 72% RQD							GNEISS BECOMES MEDIUM GRAY, SLIGHTLY WEATHERED AND MODERATELY HAR FROM 31' TO 39.5'. WITH FOLIATION SUB HORIZONTAL TO 45 DEGREES. (3-65)
50											
10											
		R3	43'-53'	98% REC 88% RQD							ROUGH JOINTS TO 39.5', MAINLY SUB-HORIZONTAL JOINTS ACROSS FOLIATION. AT 38.8', A 70-DEGREE FOLIATION JOINT, ROUGH, TIGHT, OXIDIZED.
60											
20											
		R4	53'-63'	95% REC 91% RQD							GOOD ROCK BELOW 39.5'. MODERATELY HARD TO HARD, WITH FOLIATION SUB-HORIZONTAL (PREDOMINANT) TO SUBVERTICAL. MODERATELY CLOSE JOINT SPACING FROM 39.5' TO 48' AND BELOW 58'; CLOSE SPACING FROM 48' T 58'.
70											
30											
		R5	63'-73'	98% REC 90% RQD							FROM 49.5' TO 51', A SUBVERTICAL JOINT, SMOOTH, MICA TIGHT WITH TWO 20-DEGREE JOINTS ACROSS FOLIATION, TIGHT, ROUGH.
80											
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO MG-B22-99
LINE & STA. N:322,879.17
OFFSET E:624,842.21

DEPTH _____ FT ____ FT CASING OUT DATE _____
DEPTH _____ FT ALL CASING OUT DATE _____

DATE START 2-9-99
DATE FINISH 2-10-99

GROUND ELEVATION 193.22
GROUND WATER ELEVATION 179.11 2/10/99

CASING O.D HW I.D _____
SAMPLER O.D. 2" I.D _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
		R6	73'-83'	97%	F:EC					83'	FROM 54.5' TO 55.5' TWO 60-DEGREE JOINTS ACROSS FOLIATION, OXIDIZED SMOOTH, TIGHT, WITH TWO 10-DEGREE JOINTS ACROSS FOLIATION, ROUGH. TIGHT. AT 75', 76.7' AND 77.5', 75-DEGREE FOLIATION JOINTS, SMOOTH, TIGHT, MICA. (1-65)
				91%	F:QD						
90											
10											
											END OF HOLE 83'
100											
20											
110											
30											
120											
40											

Soil Engineer: _____ Driller: GUS SURI

Drilling Inspector: _____ Helper: STEVEN LUEDDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B23-99
LINE & STA N:323,124.25
OFFSET E:624,872.68

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE START: 3-3-99
DATE FINISH: 3-4-99

GROUND ELEVATION 192.34
GROUND WATER ELEVATION 180.88 3/24/99

CASING O.D. HW ____ I.D. ____
SAMPLER O.D. 2" ____ I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	TOPSOIL 4". DARK BROWN SANDY SILT, SOFT TO MEDIUM
		SS1	0'-2'	6"	1	1	2	2		4'	STIFF, SLIGHTLY PLASTIC, ORGANIC MATTER. (ML)(11-65)
		SS2	2'-4'	9"	3	3	4	5			RUSTY BROWN SILTY F-M SAND, TRACE GRAVEL. MICA, ROCK FRAGMENTS, COBBLES AND BOULDERS PRESENT BELOW 6' WHERE MATERIAL IS GENERALLY VERY DENSE. POSSIBLE SAPROLITIC SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
		SS3	4'-6'	8"	3	4	4	4			
		SS4	6'-7'	3"	45	100	100	/0"			
		SS5	8'-8.5'	1"	100	/6"					
10											
		R1	14'-15'	75% REC 50% RQD						14'	
20											GNEISS. LIGHT TO MEDIUM GRAY, GENERALLY AMPHIL-BOLITIC WITH IN-TERMITTENT QUARTZITIC BANDS. QUARTZITIC FROM 37' TO 39'. FAINTLY WEATHERED TO UNWEATHERED. FOLIATION AT 50 TO 75 DEGREES, MOSTLY AT 60 DE-GREES. OXIDATION ON JOINTS TO 15' AND FROM 38.5' TO 39.25'. MODERATELY CLOSE JOINT SPACING.
		R2	14'-25'	100 % REC 81% RQD							
30											
		R3	25'-35'	100 % REC 90% RQD							
40											

Soil Engineer: ____ Driller: JAKE HARRIS

Drilling Inspector: ____ Helper: DAVE HARRIS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B23-99
LINE & STA. N:323,124.25
OFFSET E:624,872.68

DEPTH ____ FT ____ FT. CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 3-3-99
DATE. FINISH: 3-4-99

GROUND ELEVATION 192.34
GROUND WATER ELEVATION 180.88 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											
		R4	35'-45'	100 %	REC						
				90%	RQD						
50											
10											
		R5	45'-55'	100 %	REC						
				91%	RQD						
60											
20											
		R6	55'-65'	98%	REC						
				89%							
70											
30											
		R7	65'-75'	100 %	REC						
				93%	RQD						
80		R8	75'-80'	100 %	REC						
40				76%	RQD					80'	

FROM 14.7' TO 15', A FOLIATION JOINT AT 60 DEGREES, ROUGH, OXIDIZED, OPEN. FROM 18.5' T 29.5' A FOLIATION JOINT AT 75 DE-GREES, ROUGH, TIGHT.

FROM 34' TO 35', ROCK IS JOINTED ALONG FOLIATION WITH FOUR JOINTS AT 70 DEGREES, ROUGH, TIGHT.

FROM 56.5' TO 56.8' A FOLIATION JOINT AT 60 DEGREES, ROUGH, TIGHT, MODERATELY ALTERED IN CHLORITE, WITH 5-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT. CLOE JOINT SPACING.

FROM 65' TO 66.5' AND 77.5' TO 78.4' A 70-DEGREE FOLIATION JOINT, SMOOTH, OPEN, SOFT, ALTERED IN CHLORITE, WITH TWC 5-DEGREE JOINTS ACROSS FOLIATION, ROUGH.

Soil Engineer: ____ Driller: JAKE HARRIS

Drilling Inspector: ____ Helper: DAVE HARRIS

JOB LOCATION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B23-99
LINE & STA N:323,124.25
OFFSET E:624,872.68

DEPTH ____ FT ____ FT CASING OUT DATE: ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE, START: 3-3-99
DATE, FINISH: 3-4-99

GROUND ELEVATION 192.34
GROUND WATER ELEVATION 180.88 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0								IN GENERAL, THE ROCK QUALITY IS GOOD. (2-65)
										END OF HOLE 80'
										WATER PRESSURE TESTS IN ROCK FROM 14' TO 74'.
		10								PIEZOMETER INSTALLED AT 68.5'
		20								
		30								
		40								

Soil Engineer: ____ Driller: JAKE HARRIS

Drilling Inspector: ____ Helper: DAVE HARRIS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B24-99
LINE & STA. N:323,401.34
OFFSET E:624,904.28

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START 2-23-99
DATE. FINISH 2-24-99

GROUND ELEVATION 185.74
GROUND WATER ELEVATION 179.13 2/26/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
									0'-2'	TOPSOIL (3). DARK GRAY SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65
	SS1	0'-2'	11"	1	2	2	3			
	SS2	2'-4'	14"	4	6	5	7			
	SS3	4'-6'	16"	14	17	18	21			RUSTY BROWN SILTY FINE SAND, SOME GRAVEL FROM 6' TO 10'. MEDIUM DENSE TO VERY DENSE. (SM) (6-65)
	SS4	6'-8'	12"	29	37	40	100			
	SS5	8'-8.1'	1"	100	/2"		/4"		11'	
	R1	11'-21'	77% REC 65% RQD							GNEISS. MEDIUM GRAY, HARD. OXIDATION ON JOINT FROM 11' TO 19' AN FROM 36' TO 41.5'. FOLIATION AT 60 DE GREES TO SUB-VERTICAL TO IN-DISTINCT. ROCK SLIGHTLY SCHISTOSE BELOW 32'.
	R2	21'-31'	98% REC 78% RQD							SUBVERTICAL JOINT ACROSS FOLIATION FROM 24' TO 26' AL TERED IN EPIDOTE AND CHLORITE WITH 20-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT, EPIDOTE. GENERALLY GOOD ROCK FROM 26' TO 36'. (3-65/2-65)

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B24-99
LINE & STA. N:323,401.34
OFFSET E:624,904.28

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE. START: 2-23-99
DATE. FINISH: 2-24-99

GROUND ELEVATION 185.74
GROUND WATER ELEVATION 179.13 2/26/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0 o	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		R3	31'-41'	98% REC							FROM 36' TO 41.5', A SUBVERTICAL JOINT, OXIDIZED, ALTERED IN CHLORIT AND EPIDOTE, WITH NINE 10-DEGREE JOINTS ACROSS FOLIATION. (3-65)
40				47% RQD							
50											
-10		R4	41'-51'	99% REC							JOINTS BELOW 51' ARE SMOOTH, TIGHT, AT 30 TO 40 DEGREES. GOOD ROCK FROM 41.5' TO 65', WITH MODERATELY CLOSE JOINT SPACING. (1-65)
				98% RQD							
60											
-20		R5	51'-61'	100 % REC							
				94% RQD							
		R6	61'-65'	100 % REC						65'	
				96% RQD							
70											END OF HOLE 65'
-30											
80											
-40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B25-99
LINE & STA N: 323,596.59
OFFSET E: 624,955.96

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE START 2-24-99
DATE FINISH 2-25-99

GROUND ELEVATION 181.35
GROUND WATER ELEVATION 177.13 2/26/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	24"	25	17	11	10		0'-	RUSTY BROWN SILTY F-M SAND, TRACE TO SOME GRAVEL. MEDIU DENSE TO VERY DENSE. (SM,SP-SM) (6-65)
		SS2	2'-4'	12"	18	25	26	25			
		SS3	4'-5.2'	10"	20	55	100	/3"		6'	
		SS4	6'-8'	12"	46	36	30	33			YELLOW BROWN SILTY F-M SAND, SOME GRAVEL, MICA, ROCK FRAGMENTS (GNEISS) VERY DENSE. POSSIBLE SAPROLITI SOIL(DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
10		SS5	8'-10'	18"	37	36	76	50			
		SS6	10.1'-10.7'	4"	49	100	/3"			11.6'	
		R1	11.6'-16.6'	47% REC 17% RQD							GNEISS. MEDIUM GRAY. WEATHERED AN FRACTURED FROM 11.6' TO 23'. FOLIATION AT 60 DEGREES TO SUBVERT ICAL. OXIDATION ON JOINTS TO 23'. A SUBVERTICAL FOLIA-TION JOINT FROM 2C TO 23', OXIDIZED, SOFT, FRIABLE,OPEN IN COMBINATION WIT SIX SUBHORIZONTAL JOINTS, OXIDIZED, ROUGH, OPEN. (3-65)
20		R2	16.6'-21.6'	80% REC 30% RQD							
		R3	21.6'-26.6'	85% REC 43% RQD							
30		R4	26.6'-31.6'	100 % REC 95% RQD							
		R5	31.6'-35'	96% REC 81% RQD						35'	ROCK QUALITY IM-PROVES BELOW 23' WITH MODERATELY CLOSE JOINT SPACING.
40											

Soil Engineer: ____ Driller: GREG MARNEY JR.

Drilling Inspector: ____ Helper: THEO RODRIGUEZ

SOIL LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B25-99
LINE & STA N:323,596.59
OFFSET E: 624,955.96

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE, START 2-24-99
DATE, FINISH 2-25-99

GROUND ELEVATION 181.35
GROUND WATER ELEVATION 177.13 2/26/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											BELOW 26.5', CHLORITE ALTERATIC ON JOINTS ACROSS FOLIATION AT 10 TC 25 DEGREES. (2-65)
											END OF HOLE 35'
10											
20											
30											
40											

Soil Engineer: ____ Driller: GREG MARNEY JR.

Drilling Inspector: ____ Helper: THEO RODRIGUEZ

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B26-99
LINE & STA N:322,869.32
OFFSET E:624,941.05

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-5-99
DATE FINISH 2-8-99

GROUND ELEVATION 191.48
GROUND WATER ELEVATION 175.48 2/5/99

CASING O.D. HW ____ I.D. ____
SAMPLER O.D. 2" ____ I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-2'	TOPSOIL (3"). DARK BROWN SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS1	0'-2'	10"	5	3	2	2			
		SS2	2'-4'	14"	4	6	6	9			
		SS3	4'-6'	3"	28	100	/1"				TAN BROWN SILTY FINE SAND, TRACE GRAVEL TO 4', SOME GRAVEL TO 8', SOME BOULDERS (8' TO 10 AND 13' TO 23'). GENERALLY DENSE. (SM AND GM) (6-65)
		SS4	6'-8'	3"	19	22	27	31			
10		R1	8'-10'	58"	REC	BOU	LDE	RS			
		SS5	10'-10.2'	NR							
		SS6	12'-12.6'	5"	34	100	/1"				
20											
		R2	13'-23'	32%	REC	BOU	LDE	RS			
		SS7	23'-23.4'	3"	100	/5"					
30											
		R3	23.5'-33.5'	NR							
		SS8	33.5'-33.4'	3"	100	/5"				33'	RUSTY BROWN SILTY F-M SAND WITH ROCI FRAGMENTS (GNEISS) MICA, COBBLES. GENERALLY VERY DENSE.
40		R4	33.5'-40'	NR							

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B26-99
LINE & STA N:322,869.32
OFFSET E:624,941.05

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ____ ft ALT CASING OUT DATE ____

DATE START: 2-5-99
DATE FINISH: 2-8-99

GROUND ELEVATION 191.48
GROUND WATER ELEVATION 175.48 2/5/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS9	40'-40.5'	3"	100	/6"				40.5'	POSSIBLE SAPROLITI SOIL(DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
40		R5	40.5'-45.5'	70% REC 60% RQD							GNEISS. AMPHIBOLITIC, WEATHERED AND FRACTURED FROM 40.5' TO 42'. ROCK QUALITY IM-PROVES AT 42'.HARI SLIGHTLY WEATHERE TO UNWEATHERED, MEDIUM GRAY GNEIS BELOW 42'. FOLIAT-ION AT 20 TO 40 DEGREES. MODERATE CLOSE JOINT SPACING. A FEW SUBHORIZONTAL JOINTS ACROSS FOLIATION. GENERALLY GOOD GOCK. (1-65) AT 57.4', A SMOOT JOINT WITH FOLIATION TREND A 30 DEGREES. AT 58.6', A SMOOTH FOLIATION JOINT A 30 DEGREES, MICA.
50 -10											
		R6	45.5'-55.5'	96% REC 92% RQD							
60 -20											
		R7	55.5'-65.5'	99% REC 95% RQD							
70 -30											
		R8	65.5'-75.5'	99% REC 96% RQD						75.5'	
80 -40											END OF HOLE 75.5'

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 4
LOCATION BRONX, NY
HOLE NO MG-B27-99
LINE & STA N:323,015.09
OFFSET E:624,959.81

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE START 2-3-99
DATE FINISH 2-4-99

GROUND ELEVATION 192.16
GROUND WATER ELEVATION 185.47 2/5/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	14"	3	3	2	3		0'-2'	TOPSOIL(2"). RUSTY BROWN SILTY FINE SAND, ORGANIC MATTER, TRACE GRAVEL. LOOSE. (SM) (11-65)
		SS2	2'-4'	12"	2	4	4	5			
		SS3	4'-6'	6"	4	5	20	25			
		SS4	6'-8'	6"	25	30	31	32			RUSTY BROWN SILTY FINE SAND, TRACE T SOME GRAVEL. LOOSE
		SS5	8'	NR	100	/0"				10'	TO 4', FROM 4' TO 12' DENSE TO VERY DENSE. (SM) (6-65)
10		R1	8'-13'	45%	REC	BOU	LDE	RS			GREENISH GRAY SILT F-C SAND, SOME TO LITTLE GRAVEL, COBBLES AND BOULDERS. BOULDERS CORED FROM 8' TO 13'. VERY DENSE. TILL MATERIAL.
		SS6	14'-16'	8"	24	52	36	43			
		SS7	16'-18'	10"	27	28	34	44			
		SS8	18'	NR	100	/0"	BOU	LDE	RS		
20		SS9	20'-22'	8"2	6	35	38	41		22'	(SM AND GM) (6-65/5-65)
	SS	10	22'-24'	10"	39	43	55	77			YELLOW BROWN SILTY F-M SAND WITH ROCK
	SS	11	24'-26'	12"	67	79	85	91		26'	FRAGMENTS (GNEISS) MICA. VERY DENSE. POSSIBLE SAPROLITI SOIL(DECOMPOSED ROCK) (SP-SM AND GP-GM) (6-65/5-65)
30		R2	26'-32'	85% REC 22% RQD							GNEISS. MEDIUM GRA FROM 26' TO 37', SOF TO MODERATELY HARD WEATHERED, OXIDIZED, FRACTURED FOLIATION FROM SUB HORIZONTAL TO 60 DEGREES. CLOSE
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 4
LOCATION BRONX, NY
HOLE NO MG-B27-99
LINE & STA N:323,015.09
OFFSET E:624,959.81

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-3-99
DATE FINISH 2-4-99

GROUND ELEVATION 192.16
GROUND WATER ELEVATION 185.47 2/5/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										
40	R3	32'-42'	90% REC 48% RQD							JOINT SPACING. (4-65/3-65) ROCK QUALITY IMPROVES AT 37'. FRC 37' TO 42' ROCK IS MODERATELY WEATHERED, SOFT, CLOSELY JOINTED. FROM 36.5' TO 37', A SUBVERTICAL FOLIATION JOINT, SMOOTH, CHLORITE, OPEN, SOFT, FRIABL WTIH THREE 5 TO 10-DEGREE JOINTS ACROSS FOLIATION, ROUGH, CARBONATE COATING. FROM 39.5' TO 40.8' A 80-DEGREE FOLIATION JOINT, SMOOTH, TIGHT, WITH TWO JOINTS WITH FOLIATION TREND, ROUGH, OPEN. (3-65)
10										
	R4	42'-52'	98% REC 75% RQD							
60										
20										
	R5	52'-62'	98% REC 85% RQD							
70										
30										
	R6	62'-72'	98% REC 90% RQD							FROM 42' TO 53.2', MODERATELY CLOSE JOINT SPACING, SLIGHTLY WEATHERE TO UNWEATHERED. FOLIATION AT 30 T 80 DEGREES.
	R7	72'-77'	98% REC 91% RQD						77'	FROM 42' TO 43.2', AN 80-DEGREE FOLIATION JOINT, SMOOTH, OPEN, MIC
80										
40										

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET _ OF _
LOCATION BRONX, NY
HOLE NO MG-B27-99
LINE & STA N:323,015.09
OFFSET E:624,959.81

DEPTH _____ FT ____ FT CASING OUT DATE _____
DEPTH _____ FT ALL CASING OUT DATE _____

DATE START 2-3-99
DATE FINISH 2-4-99

GROUND ELEVATION 192.16
GROUND WATER ELEVATION 185.47 2/5/99

CASING O.D HW ID _____
SAMPLER O.D 2" ID _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0								WITH THREE 10-DEGREE JOINTS(ONE WITH FOLIATION TREND AND TWO ACROSS FOLIATION). OPEN, ROUGH. FROM 47.7' TO 49', A 60-DEGREE FOLIATION JOINT, SMOOTH, OPEN, MICA, CHLORITE, SOFT, WITH A 10-DEGREE JOINT ACROSS FOLIATION ROUGH, OPEN. AT 51', A 60-DEGREE FOLIATION JOINT, SMOOTH, OPEN WITH A 20-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT. FROM 52' TO 53.2', FRACTURED WITH TWO FOLIATION JOINTS, SMOOTH, OPEN, AN 80-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT AND TWO 10-DEGREE JOINTS WITH FOLIATION TREND, ROUGH, OPEN. (2-65)
		10								
		20								
		30								BELOW 53.2', HARD, UNWEATHERED ROCK. FOLIATION AT 40 TO 60 DEGREES. MODERATELY CLOSE TO WIDE JOINT SPACING.
		40								

Soil Engineer: _____ Driller: GUS SURI

Drilling Inspector: _____ Helper: STEVEN LUEDDEKE

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR. METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 4
LOCATION BRONX, NY
HOLE NO MG-B27-99
LINE & STA N:323,015.09
OFFSET E:624,959.81

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START 2-3-99
DATE. FINISH. 2-4-99

GROUND ELEVATION 192.16
GROUND WATER ELEVATION 185.47 2/5/99

CASING O.D. HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0								AT 72' AND 73', 80 AND 70-DEGREE FOLIATION JOINTS RESPECTIVELY, SMOOTH, TIGHT, MICA. AT 73.8', A 60-DEGREE JOINT ACROS FOLIATION, ROUGH, TIGHT. AT 74.1', A 50-DEGREE FOLIATION JOINT, SMOOTH, MICA FROM 74.1' TO 74.6' AN 80-DEGREE JOINT WITH FOLIATION TREND, SMOOTH, TIGHT, IRREGULAR, MICA. AT 74.6' A 20-DEGREE JOINT ACROS FOLIATION, ROUGH, TIGHT. IN GENERAL GOOD ROCK. (1-65)
		10								
		20								
		30								END OF HOLE 77'
		40								

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

MOSHOLU GOLF COURSE
VANCORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B28-99
LINE & STA N:323,214.78
OFFSET E:624,983.06

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT AT CASING OUT DATE ____

DATE START 2-3-99
DATE FINISH 2-4-99

GROUND ELEVATION 188.28
GROUND WATER ELEVATION 175.74 2/9/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	12"	2	4	3	4		0'-2'	TOPSOIL(4"). DARK GRAY SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	14"	5	7	8	10			
		SS3	4'-6'	12"	8	11	16	21			BROWN SILTY FINE T MEDIUM SAND, TRACE TO SOME GRAVEL, GRAVEL CONTENT TENDS TO INCREASE BELOW 5'. MEDIUM DENSE TO DENSE FRO 2' TO 11'. VERY
		SS4	6'-8'	12"	32	16	14	17			
10		SS5	8'-10'	11"	12	17	20	23			
		SS6	10'-12'	8"	20	24	29	31			
		SS7	12'-14'	10"	27	29	32	38		14'	DENSE BELOW 11'. (SM,SP-GM) (6-65)
		SS8	14'-16'	10"	30	37	49	100			YELLOW BROWN SILTY F-M SAND WITH MICA ROCK FRAGMENTS (GNEISS), COBBLES, PROBABLE BOULDERS. VERY DENSE. POSSIBLE SAPROLITI SOIL. (DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
		SS9	16'-18'	3"	100	/5"					
20	SS	10	18'-20'	2"	100	/4"					
	SS	11	20'-21'	2"	100	/3"				21'	
		R1	21'-26'	75% REC 66% RQD							GNEISS. LIGHT GRAY SCHISTOSE, MODERATE LY HARD TO HARD, SLIGHTLY WEATHERED TO UNWEATHERED. OXIDATION ON JOINT TO 30'.
30		R2	26'-36'	98% REC 62% RQD							FOLIATION AT 10 TO 30 DEGREES FROM 21' TO 33'; AT 30 TO 50 DEGREE FROM 33' TO 56'; 50 TO 70 DEGREES
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VANCORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

LOCATION BRONX, NY
HOLE NO MG-B28-99
LINE & STA N:323,214.78
OFFSET E:624,983.06

DEPTH ____ FT ____ IT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-3-99
DATE FINISH 2-4-99

GROUND ELEVATION 188.28
GROUND WATER ELEVATION 175.74 2/9/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											BELOW 56'.
											CLOSE JOINT SPACIN FROM 21' TO 30'. 10 TO 30-DEGREE FOLIATION JOINTS PREDOMINATE, AT 21', 22.8', SMOOTH FOLIATION JOINTS, TIGHT, MICA. (3-65)
		R3	36'-46'	99% REC 93% RQD							
50											
10											
											BELOW 30', MODERATELY CLOSE JOINT SPACING. AT 33' AND 34', SMOOTH FOLIATION JOINTS, TIGHT, MICA FROM 46.5' TO 46.8' A 60-DEGREE JOINT ACROSS FOLIATION, IRREGULAR, TIGHT, CHLORITE.
S		R4	46'-56'	99% REC 86% RQD							
60											
20											
											FROM 55.6' TO 56', TWO 60-DEGREE FOLIATION JOINTS, SMOOTH, TIGHT, MICA
		R5	56'-66'	98% REC 86% RQD						66'	FROM 56' TO 56.7', FRACTURED ROCK, CHLORITE ALTERATION, SOFT, WITH FIVE SUB-HORIZONTAL JOINTS, OPEN. POSSIBLE SHEARING. MODERATELY JOINTED BELOW 57'. ROCK IS GENERALLY GOOD. (1-65/2-65)
70											
30											
80											
40											END OF HOLE 66'

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-829-99
LINE & STA N:323,392.71
OFFSET E:625,005.14

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START. 3-9-99
DATE. FINISH. 3-11-99

GROUND ELEVATION 181.72
GROUND WATER ELEVATION 177.85 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	9"	1	2	2	2		0'-	TOPSOIL(3"). DARK BROWN AND LIGHT BROWN SILTY FINE SAND. LOOSE TO MEDIUM DENSE. (SM) (7-65)
		SS2	2'-4'	13"	3	5	7	7		4'	
10		R1	4'-10'	30% REC 88% RQD	BOU	LDE	RS			10'	SILTY SAND WITH COBBLES AND BOULDERS. (GM AND SM) (6-65)
		R2	10'-15'	95% REC 88% RQD							GNEISS. MEDIUM GRAY, HARD, SCHISTOSE FROM 25' TO 27.5', 42' TO 45'. FAINTLY WEATHERED TO UN-WEATHERED. FOLIATION AT 40 TO 50 DEGREES. FOLIATION AT 70 DEGREES TO SUB-VERTICAL FROM 15' TO 17.5', 29.4' TO 31.2'. INDISTINCT FROM 31.2' TO 35'. OXIDATION ON JOINT TO 32', CLOSE TO MODERATELY CLOSE JOINT SPACING. VER CLOSE SPACING FROM 31' TO 34'.
20											
		R3	15'-25'	96% REC 73% RQD							
30											
		R3	25'-35'	97% REC 48% RQD							GOOD ROCK FROM 35' TO 40' AND BELOW 45'.
40											FROM 15.5' TO 16.8' A SUBVERTICAL FOLIATION JOINT.

Soil Engineer: ____ Driller: JAKE HARRIS

Drilling Inspector: ____ Helper: DAVE HARRIS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

LOCATION: BRONX, NY
HOLE NO: MG-B29-99
LINE & STA: N:323,392.71
OFFSET: E:625,005.14

DEPTH _____ FT ____ IT CASING OUT DATE _____
DEPTH _____ FT ALT CASING OUT DATE. _____

DATE. START: 3-9-99
DATE. FINISH: 3-11-99

GROUND ELEVATION 181.72
GROUND WATER ELEVATION 177.85 3/24/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											
		R5	35'-45'	98% REC 80% RQD							IRREGULAR, OXIDIZED TIGHT, ROUGH, AT 17.7' AND 18.9', TWO 60-DEGREE JOINTS ACROSS FOLIATION, OXIDIZED ROUGH, OPEN. FROM 30.7' TO 31.9' A SUBVERTICAL JOINT, CURVED, IRREGULAR, OXIDIZED ROUGH, OPEN, CARBONATE COATING WITH A 10-DEGREE JOINT ACROSS FOLIATION, OPEN.
50											
-10											
		R6	45'-55'	98% REC 80% RQD							FROM 31.9' TO 33.3' FRACTURED ZONE ALONG FOLIATION, SOFT AND FRIABLE, WITH CHLORITIC ALTERATION, CARBONAT COATING. POSSIBLE SHEAR ZONE.
60											
-20											
		R7	55'-65'	98% REC 98% RQD						65'	AT 42', A 50-DEGRE JOINT ACROSS FOLIATION, SMOOTH, TIGHT. FROM 42.4' TO 45', SEVEN FOLIATION JOINTS AT 40 DEGREES, SMOOTH, AND ONE SUB-HORIZONTAL JOINTS, ROUGH, TIGHT.
70											
-30											
-40											

Soil Engineer: _____ Driller: JAKE HARRIS

Drilling Inspector: _____ Helper: DAVE HARRIS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET — OF 3
LOCATION BRONX, NY
HOLE NO. MG-B29-99
LINE & STA N:323,392.71
OFFSET E:625,005.14

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT. ALL CASING OUT DATE ____

DATE START 3-9-99
DATE FINISH 3-11-99

GROUND ELEVATION 181.72
GROUND WATER ELEVATION 177.85 3/24/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											FROM 47.4' TO 47.15', TWO 60-DEGREE FOLIATION JOINTS, SMOOTH, TIGHT.
											FROM 50' TO 50.5', A 70-DEGREE JOINT, SMOOTH, ALTERATION IN EPIDOTE.
10											FROM 50.75' TO 51.3' THREE FOLIATION JOINTS, ROUGH, TIGHT, ALTERATION IN EPIDOTE. (2-65)
											END OF HOLE 65'
20											ORIENTED CORE FROM 45' TO 65'.
											WATER PRESSURE TESTS IN ROCK FROM 15' TO 65'.
30											PIEZOMETER INSTALLED AT 55'.
40											

Soil Engineer: ____ Driller: JAKE HARRIS

Drilling Inspector: ____ Helper: DAVE HARRIS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET ___ OF ___
LOCATION BRONX, NY
HOLE NO MG-B30-99
LINE & STA N:322,855.71
OFFSET E:625,040.79

DEPTH ___ ft ___ ft CASING OUT DATE ___
DEPTH ___ ft ALT CASING OUT DATE ___

DATE START 2-17-99
DATE FINISH 2-24-99

GROUND ELEVATION 193.87
GROUND WATER ELEVATION 176.32 3/24/99

CASING OD HW ID ___
SAMPLER OD 2" ID ___
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6 ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	16"	3	3	2	2		0'-2'	TOPSOIL(2"). DARK BROWN SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	20"	6	5	5	7			
		SS3	4'-6'	6"	10	20	22	19			RUSTY BROWN SILTY F-M SAND, TRACE TO SOME GRAVEL. MEDIU DENSE TO DENSE. (SM,SP-SM) (6-65)
		SS4	6'-8'	8"	23	24	26	21			
10		SS5	8'-10'	8"	10	13	14	16			
										16'	
		SS6	16'3"-18'3"	5"	24	26	31	45			BROWN GRAY SILTY SAND, TRACE TO SOM GRAVEL, COBBLES. BOULDERS. VERY DENSE. POSSIBLE TILL MATERIAL. (SM AND GM) (6-65/5-65)
20		R1	18'3"-20'	8%	REC	BOU	LDE	RS			
30		R2	20'-30.5'			BOU	LDE	RS		30.5'	
		R3	30.5'-35'	94%	REC						GNEISS. LIGHT GRAY HARD. QUARTZITIC FROM 31' TO 33'; 47' TO 48'; 67' TO 71.5'. FAINTLY WEATHERED TO UN-WEATHERED. FOLIATIO MOSTLY SUBVERTICAL AT 60 DEGREES FROM 46' TO 49'.
				72%	RQD						
		R4	35'-40'	97%	REC						
40				30%	RQD						

Soil Engineer: ___ Driller: JAKE HARRIS

Drilling Inspector: ___ Helper: DAVE HARRIS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET - OF 3
LOCATION: BRONX, NY
HOLE NO: MG-B30-99
LINE & STA: N:322,855.71
OFFSET: E:625,040.79

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-17-99
DATE FINISH: 2-24-99

GROUND ELEVATION 193.87
GROUND WATER ELEVATION 176.32 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											OXIDATION ON JOINT TO 41'.
		R5	40'-45.5'	100 % REC 82% RQD							FROM 30.5' TO 35', JOINTS ACROSS FOLIATION PREDOMINATE. FROM 35' TO 40', 30-DEGREE JOINTS WITH FOLIATION TREND PRODOMINATE. VERY CLOSE TO CLOSE JOINT SPACING. FRACTURED FROM 38.3' TO 40', SMOOTH JOINTS. (3-65)
10		R6	45.5'-49.5'	100 % REC 46% RQD							GENERALLY GOOD ROC BELOW 40' WITH CLOSE TO MODERATEL CLOSE JOINT SPACING, EXCEPT FROM 45' TO 49' WHERE THE ROCK IS VERY CLOSELY JOINTED. A SUB-VERTICAL FOLIATION JOINT FROM 47' TO 49.5', ROUGH, PITTE CORE SURFACE. FROM 53.7' TO 54.2', A 70-DEGREE FOLIATIO JOINT, SMOOTH.
60		R7	49.5'-59.5'	100 % REC 84% RQD							
20											
70		R8	59.5'-69'	100 % REC 99% RQD							
30											
		R9	69'-75'	99% REC 97% RQD						75'	BELOW 69', ONLY A FEW SUBHORIZONTAL JOINTS, ROUGH, TIGHT. (1-65)
80											END OF HOLE 75'
40											

Soil Engineer: ____ Driller: JAKE HARRIS

Drilling Inspector: ____ Helper: DAVE HARRIS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L-99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET ___ OF ___
LOCATION BRONX, NY
HOLE NO MG-B30-99
LINE & STA N:322,855.71
OFFSET E:625,040.79

DEPTH ___ ft ___ ft CASING OUT DATE ___
DEPTH ___ ft ALL CASING OUT DATE ___

DATE START 2-17-99
DATE FINISH 2-24-99

GROUND ELEVATION 193.87
GROUND WATER ELEVATION 176.32 3/24/99

CASING O.D. HW I.D. ___
SAMPLER O.D. 2" I.D. ___
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0								ORIENTED CORE FROM 30' TO 75'. WATER PRESSURE TESTS IN ROCK FROM 30' TO 75'. TWO PIEZOMETERS INSTALLED AT 32' AND 70'.
		10								
		20								
		30								
		40								

Soil Engineer: ___ Driller: JAKE HARRIS

Drilling Inspector: ___ Helper: DAVE HARRIS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B31-99
LINE & STA N:323,103,27
OFFSET E:625,070.95

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____
DATE START 2-1-99
DATE FINISH 2-2-99
GROUND ELEVATION 188.34
GROUND WATER ELEVATION 172.93 2/6/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ
WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.
HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0 - 6	6 - 12	12 - 18	18 - 24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	12"	7	5	5	4		0'-2'	TOPSOIL(4"). DARK BROWN SILTY SAND, ORGANIC MATTER. LOOSE.(SM) (11-65)
		SS2	2'-4'	10"	12	10	9	6			
		SS3	4'-6'	12"	13	11	6	11		6'	RUSTY BROWN SILTY FINE SAND, TRACE GRAVEL. MEDIUM DENSE. (SM) (7-65)
		SS4	6'-8'	14"	22	20	20	23			
10		SS5	8'-10'	12"	24	21	30	47			GREENISH GRAY SILT SAND, SOME TO LITTLE GRAVEL, COBBLES. DENSE TO VERY DENSE. TILL MATERIAL. (SP-SM AND GP-GM) (6-65)
		SS6	10'-10.5'	2"	100	/2"	WAS	H			
20		R1	10.5'-20.5'	28%	REC					20.5'	GNEISS. MEDIUM GRAY, HARD, MODERATELY WEATHERED, OXIDIZE ON JOINTS TO 61.5' FOLIATION AT 30 TO 60 DEGREES TO 31'; 60 TO 70 DEGREES FROM 31' T 55'; INDISTINCT BELOW 55'.
30		R2	20.5'-30.5'	98%	REC						CLOSE TO MODERATEL CLOSE JOINT SPACIN FROM 20.5' TO 40.5' SUBHORIZONTAL JOINTS PREDOMINATE FRACTURED FROM 20.5' TO 22.5', A
				71%	RQD						
40		R3	30.5'-40.5'	98%	REC						
				80%	RQD						

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

SOIL LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B31-99
LINE & STA N:323,103.27
OFFSET E:625,070.95

DEPTH ____ FT ____ IT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-1-99
DATE FINISH 2-2-99

GROUND ELEVATION 188.34
GROUND WATER ELEVATION 172.93 2/5/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											VERTICAL JOINT FRO 37.7' TO 40.5', OXIDIZED, ROUGH, WITH SIX 5-DEGREE JOINTS, OXIDIZED, ROUGH, TIGHT. (2-65
50											QUARTZITIC GNEISS FROM 40.5' TO 43' AND FROM 51' TO 59.5'.
10		R4	40.5'-50.5'	99% REC 91% RQD							BELOW 40.5', HARD, WEATHERED, MODERATELY CLOSE JOINT SPACING. SUB HORIZONTAL JOINTS PREDOMINATE BELOW 50.5'.
60											FROM 43.2'TO 43.7' AND 44.2' TO 44.7' TWO 60-DEGREE JOINTS ACROSS FOLIATION, ROUGH, OXIDIZED, TIGHT.
20		R6	50.5'-60.5'	99% REC 84% RQD							FROM 58.7'TO 59.7' A 70-DEGREE FOLIATION JOINT, SMOOTH, TIGHT, COATED WITH CARBONATE, WITH THREE SUBHORIZONTA JOINTS, OXIDIZED, ROUGH. GENERALLY
70											
30		R6	60.5'-70.5'	98% REC 90% RQD							
		R7	70.5'-75.5'	96% REC 93% RQD						75.5'	GOOD ROCK BELOW 40.5'. (1-65)
80											END OF HOLE 75.5'
40											

Soil Engineer ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED 543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B32-99
LINE & STA N:323,378.75
OFFSET E:625,106.97

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 3-3-99
DATE FINISH 3-4-99

GROUND ELEVATION 180.87
GROUND WATER ELEVATION 176.33 3/5/99

CASING OD HW ID ____
SAMPLER OD 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	18"	4	3	2	2		0'-2'	DARK BROWN SILTY SAND, SOME GRAVEL, ORGANIC MATTER. (SM) (11-65)
		SS2	2'-4'	14"	2	4	6	7			
		SS3	4'-6'	15"	5	7	7	9			BROWN SILTY FINE SAND WITH SAND SIL INTERLAYERS. POSSIBLE COBBLES FROM 8' TO 10'. MEDIUM DENSE TO VERY DENSE. (SM) (6-65)
		SS4	6'-8'	8"	12	16	19	22			
10		SS5	8'-10'	NR3	2	33	39	20		10'	
		SS6	10'-12'	11"	9	11	12	13			
		SS7	12'-14'	12"	14	19	38	42		15'	RUSTY BROWN SILTY F-M SAND, TRACE GRAVEL, MICA, ROCK FRAGMENTS. DENSE T VERY DENSE. POSSIBLE SAPROLITI SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65)
20											
		R1	15'-25'	100 %	REC						GNEISS. MEDIUM GRAY, HARD. FOLIATION AT 50 TO 60 DEGREES, SUB-VERTICAL FROM 15' TO 22' AND BELOW 45'. FAINTLY WEATHERED. OXIDATION ON JOINT TO 16.5'. CLOSE TO MODERATEL CLOSE JOINT SPACING FROM 30.5 TO 36'. MODERATELY CLOSE SPACING BELOW 36'.
				100 %	RQD						
30		R2	25'-35'	100 %	REC						
				90%	RQD						
40											

Soil Engineer: ____ Driller: ____

Drilling Inspector: ____ Helper: ____

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED 543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B32-99
LINE & STA N:323,378.75
OFFSET E:625,106.97

DEPTH ____ FT ____ FT CASING OUT DATE: ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE, START 3-3-99
DATE, FINISH 3-4-99

GROUND ELEVATION 180.87
GROUND WATER ELEVATION 176.33 3/5/99

CASING O.D HW ID ____
SAMPLER O.D 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											
		R3	35'-45'	98% REC 70% RQD							
50											
10											
		R4	45'-55'	98% REC 98% RQD							
60											
20		R5	55'-60'	100 % REC 100 % RQD						60'	AT 15.8', A 60-DEGREE FOLIATION JOINT, SLIGHTLY OXIDIZED, SMOOTH, OPEN. AT 16.5', A 70-DEGREE JOINT ACROSS FOLIATION, OXIDIZED, SMOOTH, TIGHT. AT 33' AND 34', TWO 60-DEGREE JOINTS WITH FOLIATION TREND, SMOOTH, OPEN, CHLORITE ALTERATION. FROM 33.5' TO 33.75' SOFT, FRIABLE ZONE, ALTERATION IN EPIDOTE. POSSIBLE SHEAR ZONE. AT 34.2', A 40-DEGREE JOINT ACROSS FOLIATION, SMOOTH, JOINT, OPEN. FROM 36.3' TO 37.75', AN 80-DEGREE JOINT ACROSS FOLIATION, ROUGH, OPEN, ALTERATION CHLORITE. (1-65)
70											
30											END OF HOLE 60'
80											
40											

Soil Engineer: ____ Driller: ____

Drilling Inspector: ____ Helper: ____

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B33-99
LINE & STA N:323,679.09
OFFSET E:625,141.00

DEPTH ____ FT ____ FT CASING OUT DATE: ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-25-99
DATE FINISH: 2-25-99

GROUND ELEVATION 173.13
GROUND WATER ELEVATION 169.47 2/26/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	ASPHALT(4"). FILL
										0.3'	MATERIAL. DARK GRAY
		SS1	1'-3'	18"	24	21	14	50		3'	SILTY SAND, TRACE GRAVEL. DENSE. (SM) (7-65)
		SS2	3'-5'	24"	49	10	19	27		5'	LIGHT GRAY F-M SAND, TRACE GRAVEL. DENSE. FILL MATERIAL. (SP)(6-65)
		SS3	5'-7'	24"	1	2	3	5			
		SS4	7'-9'	24"	3	4	7	8			
10		SS5	9'-11'	12"	16	22	8	5			GREENISH GRAY SILTY SAND, TRACE TO SOME GRAVEL TO 9', LITTLE GRAVELLY BELOW 9'. LOOSE TO
										15'	MEDIUM DENSE. POSSIBLE TILL MATERIAL. (SM AND GM) (6-65)
		SS6	15'-17'	12"	14	13	21	19			
20										20'	DARK BROWN SILTY FINE MEDIUM SAND, MICA, ROCK FRAG- MENTS. DENSE. POSSIBLE SAPROLITIC SOIL(DECOMPOSED ROCK). (SM AND GM) (6-65)
		R1	20'-25'	100 %	REC						
				75%	RQD						
30		R2	25'-30'	100 %	REC						GNEISS. MEDIUM GRAY. MODERATELY HARD. FOLIATION AT 50 TO 70 DEGREES. FOLIATION JOINTS PREDOMINATE. MODERATELY CLOSE TO CLOSE JOINT SPACING ON TOP 4 FEET.
				83%	RQD						
40											

Soil Engineer: ____ Driller: ____

Drilling Inspector: ____ Helper: ____

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B33-99
LINE & STA N:323,679.09
OFFSET E:625,141.00

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE, START 2-25-99
DATE, FINISH 2-25-99

GROUND ELEVATION 173.13
GROUND WATER ELEVATION 169.47 2/26/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											AT 21.75' AND 22', TWO 50-DEGREE FOLIATION JOINTS, SMOOTH, TIGHT. FROM 28.8' TO 29.25', A 70-DEGREE FOLIATION JOINT, ROUGH, TIGHT, SOME CHLORITIC ALTERATION. (2-65)
10											END OF HOLE 30'
20											
30											
40											

Soil Engineer: ____ Driller: ____

Drilling Inspector: ____ Helper: ____

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B34-99
LINE & STA. N:322,813.48
OFFSET E:625,136.85

DEPTH _____ FT ___ FT CASING OUT DATE _____
DEPTH _____ FT ALL CASING OUT DATE _____

DATE, START 2-9-99
DATE, FINISH: 2-10-99

GROUND ELEVATION 187.81
GROUND WATER ELEVATION _____

CASING OD HW ID _____
SAMPLER OD 2" ID _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER _____ LBS.
INSIDE LENGTH OF SAMPLER _____ IN.

HAMMER FALL
CASING _____ SAMPLER _____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											ANGLED BOREHOLE DIRECTION: N 8 DEGREES E ANGLE: 60 DEGREES ROLLER BIT TO TOP OF ROCK
10											
20											NOTE: ALL DEPTHS SHOWN AS "DOWN-HOLE" OR NON-VERTICAL
										26'	
30		R1	26.2'-32'	99% REC 82% RQD							GNEISS. MEDIUM GRAY, MODERATELY WEATHERED, MODERATELY HARD TO HARD TO 37'. FOLIATION AT 50 TO 85 DEGREES. OXIDATION ON JOINTS TO 100'. CLOSE TO MODERATELY CLOSE JOINT SPACING TO 40.3'.
40											

Soil Engineer. _____ Driller: GREG MARNEY

Drilling Inspector: _____ Helper: GREG WILLIAMS

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B34-99
LINE & STA N:322,813.48
OFFSET E:625,136.85

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-9-99
DATE FINISH 2-10-99

GROUND ELEVATION 187.81
GROUND WATER ELEVATION ____

CASING O.D. HW ____ I.D. ____
SAMPLER O.D. 2" ____ I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER ____ LBS.
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										
40	R2	32'-42'	99% REC 65% RQD							FROM 26.3' TO 26.9' A 70-DEGREE FOLIATION JOINT, ROUGH, OXIDIZED, TIGHT. FROM 37.3' TO 40.3', ROCK IS FRACTURED, FRIABLE ALONG A SUBVERTICAL FOLIATION JOINT, SLIGHTLY OXIDIZED, ROUGH, OPEN, WITH THREE 10-DEGREE JOINTS ACROSS FOLIATION, ROUGH, OPEN. (2-65) BELOW 40.3' MODERATELY CLOSE JOINT SPACING, EXCEPT FROM 44' TO 45' AND 56.5' TO 58' WHERE ROCK IS CLOSELY JOINTED. FROM 49.6' TO 50', A 70-DEGREE JOINT WITH FOLIATION, OXIDIZED, ROUGH, TIGHT. FROM 55.7' TO 56.5', TWO FOLIATION JOINTS, OXIDIZED, SMOOTH, TIGHT. AT 56.5' AND 63', TWO 60-DEGREE JOINTS ACROSS FOLIATION, OXIDIZED, SMOOTH, TIGHT.
50										
10	R3	42'-52'	98% REC 91% RQD							
60										
20	R4	52'-62'	94% REC 78% RQD							
70										
30	R5	62'-72'	99% REC 92% RQD							
80										
40										

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B34-99
LINE & STA N:322,813.48
OFFSET E:625,136.85

DEPTH ____ FT ____ IN CASING OUT DATE ____
DEPTH ____ IN ALL CASING OUT DATE ____

DATE. START: 2-9-99
DATE. FINISH: 2-10-99

GROUND ELEVATION 187.81
GROUND WATER ELEVATION ____

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER ____ LBS
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80		R6	72'-82'	96% REC 92% RQD							FROM 56.5' TO 58', A SUBVERTICAL JOINT ACROSS FOLIATION, OXIDIZED, ROUGH, TIGHT. FROM 64.3' TO 65', ROCK IS SOFT, FRIABLE, OXIDIZED, ALONG A 50-DEGREE FOLIATION JOINT. FROM 65' TO 99', MODERATELY CLOSE JOINT SPACING. AT 85.5', 88' AND 90.5', 70-DEGREE JOINTS ACROSS FOLIATION, OXIDIZED, ROUGH, TIGHT. IN GENERAL, THE ROCK IS GOOD FROM 40.3' TO 99'.(1-65) FROM 99' TO 101.5', ROCK IS WEATHERED, FRACTURED, FRIABLE, SOFT, OXIDIZED, WITH SIX 10-DEGREE JOINTS, OXIDIZED, ROUGH, OPEN. ROCK QUALITY IMPROVES BELOW 101.5'. (3-65/2-65)
90		R7	82'-89'	99% REC 90% RQD							
10											
		R8	89'-97'	99% REC 81% RQD							
100											
20											
		R9	97'-105'	88% REC 68% RQD						105'	
110											END OF HOLE 105'
30											
120											
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B35-99
LINE & STA. N:322,992.78
OFFSET E: 625,158.76

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-1-99
DATE FINISH 2-2-99

GROUND ELEVATION 183.24
GROUND WATER ELEVATION 175.13 2/5/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	10"	5	7	7	6		0'-2'	TOPSOIL (6"). DARK SAND, ORGANIC MATTER. MEDIUM DENSE. (SM) (11-65)
		SS2	2'-4'	12"	7	10	17	23			
		SS3	4'-6'	14"	14	14	20	15			RUSTY BROWN SILTY FINE SAND, TRACE T SOME GRAVEL. DENSE
		SS4	6'-8'	5"	71	36	38	43		8'	TO VERY DENSE. (SM, SP-SM) (7-65)
		SS5	8'	0"	100	/0"					
10											GREENISH GRAY SILT SAND, SOME TO LITTLE GRAVEL, COBBLES AND BOULDERS. VERY
		SS6	10'-12'	8"	22	44	78	100 /3"			
		SS7	12'-14'	4"	55	100	/2"				
		SS8	15'	0"	100	/0"				15'	DENSE. TILL MATERIAL. (SM AND GM) (6-65/5-65)
		SS9	16'-18'	10"	20	26	36	30	WASH		
		10	18'-19.2'	6"	45	53	100	/3"			
20											YELLOW BROWN SILTY F-M SAND WITH MICA
										21'	ROCK FRAGMENTS (GNEISS), COBBLES. VERY DENSE. POSSIBLE SAPROLITE SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
		R1	21'-27'	20% REC 6% RQD							
30											GNEISS. MEDIUM GRAY. HIGHLY WEATHERED, SOFT TO MODERATELY HARD, FRACTURED, OXIDIZED FROM 21'-32'. FOLIATION AT 70 TO 85 DEGREES. NUMEROUS FRACTURES AT 20 TO 30 DEGREES, WITH FOLIATION TREND.
		R2	27'-37'	65% REC 30% RQD							
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDEKE

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B35-99
LINE & STA N:322,992.78
OFFSET E: 625,158.76

DEPTH ____ FT ____ H CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-1-99
DATE FINISH 2-2-99

GROUND ELEVATION 183.24
GROUND WATER ELEVATION 175.13 2/5/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										
40										IRON STAINED. (4-65 ROCK QUALITY IMPROVES AT 32'. FROM 32' TO 40.5', MODERATELY HARD, WEATHERED, CLOSE JOINT SPACING. SUB VERTICAL JOINT FRO 37.5' TO 38.5'. SOME OXIDATION ON JOINTS. (3-65)
	R3	37'-47'	98% REC 75% RQD							
50										
-10										MODERATELY CLOSE JOINT SPACING BELC 40.5'. FOLIATION AT 60 DEGREES TO SUBVERTICAL. AT 54.7', AN 80-DEGREE FOLIATION JOINT, OXIDIZED, ROUGH, OPEN, AND A 40-DEGREE JOINT WITH FOLIATION TREND, OXIDIZED,
	R4	47'-57'	98% REC 96% RQD							
60										
-20										
	R5	57'-65'	99% REC 96% RQD						65'	ROUGH, OPEN. (1-65)
70										END OF HOLE 65'
-30										
80										
-40										

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B36-99
LINE & STA N:323,189.97
OFFSET E:625,184.19

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE, START 2-25-99
DATE, FINISH 2-26-99

GROUND ELEVATION 182.43
GROUND WATER ELEVATION 169.06 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	20"	4	3	3	4		0'-	TOPSOIL (4"). RUSTY BROWN SILTY F-M SAND, TRACE GRAVEL, COBBLES. LOOSE TO VERY DENSE. (SM) (7-65)
		SS2	2'-4'	18"	6	6	7	9			
		SS3	4'-6'	16"	9	9	14	15			
		SS4	6'-7.2'	NR	9	56	100	/3"			
		SS5	8'-8.1'	1"	100	/2"					
10		SS6	10'-12'	15"	14	18	29	34			ROLLER BIT FROM 12' TO TOP OF ROCK
										16'	
20		R1	16'-26'	98% REC 65% RQD							GNEISS. LIGHT GRAY TO MEDIUM GRAY. HARD. QUARTZITIC FROM 26' TO 31.5'; 43' TO 45'; AMPHIBOLITIC FROM 31.5' TO 36'; 51' TO 61' FOLIATION AT 50 DEGREES TO SUBVERTICAL. OXIDATION ON JOINTS TO 20.5'. SLIGHTLY WEATHERED TO UNWEATHERED ROCK.
30		R2	26'-36'	99% REC 82% RQD							FROM 16' TO 21' CLOSE JOINT SPACING. (3-65) GOOD ROCK BEGINS AT 21'. MODERATELY JOINTED TO MASSIVE BELOW 21'.
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B36-99
LINE & STA N:323,189.97
OFFSET E:625,184.19

DEPTH ____ FT ____ IT CASING OUT DATE ____
DEPTH ____ FT ALT CASING OUT DATE ____

DATE. START: 2-25-99
DATE. FINISH: 2-26-99

GROUND ELEVATION 182.43
GROUND WATER ELEVATION 169.06 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											
		R3	36'-46'	98% REC							FROM 16.25' TO 16.8', A 60-DEGREE FOLIATION JOINT, SMOOTH, OPEN, OXIDIZED. FROM 18.25' TO 20.25', A SUB-VERTICAL FOLIATION JOINT, OPEN, SMOOTH, OXIDIZED, WITH THREE 10-DEGREE JOINTS ACROSS FOLIATION, ROUGH, OXIDIZED. FROM 31.5' TO 32', A 60-DEGREE JOINT WITH FOLIATION TREND, ROUGH, TIGHT WITH TWO 70-DEGREE FOLIATION JOINTS, ROUGH, TIGHT. FROM 36' TO 46', A SINGLE CORE PIECE RECOVERED. (1-65)
				98% RQD							
50 10											
60 20		R4	46'-56'	100% REC							
				95% RQD							
		R5	56'-61'	99% REC						61'	
				96% RQD							
70 30											END OF HOLE 61'
											WATER PRESSURE TESTS IN ROCK FROM 20' TO 61'.
											TWO PIEZOMETERS INSTALLED AT 16' AND 58.5'.
80 40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B37-99
LINE & STA N:323,357.28
OFFSET E:625,222.24

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 3-10-99
DATE FINISH: 3-16-99

GROUND ELEVATION 175.48
GROUND WATER ELEVATION —

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV . FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
									0'–	ANGLED BOREHOLE DIRECTION: S 10 DEGREES W ANGLE 60 DEGREES ROLLER BIT TO TOP OF ROCK NOTE: ALL DEPTHS SHOWN AS "DOWN-HOLE" OR NON-VERTICAL
									21'	
	R1	21'-30'	100 % 75% RQD	REC						GNEISS. LIGHT GRAY HIGHTLY WEATHERED FROM 22' TO 26', THE REST MODERATEL WEATHERED TO UN-WEATHERED. QUARTZ-ITIC FROM 40' TO 60', 68.5' TO 79', 102' TO 104'. FOILATION AT 40 DE GREES TO SUB-VERTICAL, MOSTLY AT 70 DEGREES. OXIDATION ON JOINT TO 26' AND AT 46.75'. VERY CLOSE JOINT SPACING FROM 24' T 26',
	R2	30'-40'	98% REC 90% RQD							

0
10
20
30
N
40

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B37-99
LINE & STA N:323,357.28
OFFSET E:625,222.24

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 3-10-99
DATE FINISH: 3-16-99

GROUND ELEVATION 175.48
GROUND WATER ELEVATION -

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											MAINLY FOLIATION JOINTS, OXIDIZED. MODERATELY CLOSE JOINT SPACING BELOW 26'. IN GENERAL, ROCK IS MODERATELY JOINTED BELOW 26'. FROM 21' TO 22.8', A SUBVERTICAL FOLIATION JOINT, ROUGH, OXIDIZED, SOFT FROM 22' TO 22.8', WITH FOUR 30-DEGREE JOINTS ACROSS FOLIATION, ROUGH. FROM 21' TO 26'. (2-65) ROCK CLASS. AT 39.8', A FOLIATION JOINT AT 85 DEGREES, SMOOTH, TIGHT. FROM 60' TO 60.5', AND FROM 61.5' TO 62.25', TWO FOLIATION JOINTS AT 80 DEGREES, ROUGH, TIGHT. AT 63', A 60-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT. ACROSS IN GENERAL, VERY GOOD QUALITY ROCK BELOW 26'. (1-65)
40											
50											
10		R3	40'-50'	100 %	REC						
				98%	RQD						
60											
20		R4	50'-60'	100 %	REC						
				100 %	RQD						
70											
30		R5	60'-70'	100 %	REC						
				97%	RQD						
80		R6	70'-80'	99%	REC						
40				97%	RQD						

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B37-99
LINE & STA. N:323,357.28
OFFSET E:625,222.24

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START 3-10-99
DATE. FINISH 3-16-99

GROUND ELEVATION 175.48
GROUND WATER ELEVATION -

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80											
90											
10		R7	80'-90'	98% REC 98% RQD							
100											
20		R8	90'-100'	98% REC 98% RQD							
		R9	100'-105'	97% REC 90% RQD						105'	
110											END OF HOLE 105'
30											
120											
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B38-99
LINE & STA N:323,518.23
OFFSET E:625,223.30

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START 2-22-99
DATE. FINISH 2-23-99

GROUND ELEVATION 176.99
GROUND WATER ELEVATION 170.11 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	24"	1	1	1	1		0'-	RUSTY BROWN SILTY FINE SAND. LOOSE TO DENSE. (SM)
		SS2	2'-4'	18"	7	11	13	22		4'	(7-65)
		SS3	4'-5.5'	12"	16	26	100	/6"			BROWN SILTY F-M SAND, TRACE GRAVEL COBBLES. DENSE. (SM) (6-65)
		SS4	6'-6.5'	4"	100	/6"				7'	
10		R1	7'-12'	60"	REC						GNEISS. MEDIUM GRAY, SCHISTOSE FROM 7' TO 12'. FOLIATION AT 70 DEGREES. OXIDATION ON JOINTS TO 19.5'
				38%	RQD						
		R2	12'-17'	83%	REC						FRACTURED, WEATHERED FROM 7' TO 12'; SEVERAL STEEP FOLIATION JOINTS, OXIDIZED FROM 12' TO 16'. (3-65)
				33%	RQD						
20		R3	17'-20'	100 %	REC					20'	ROCK QUALITY IMPROVES FROM 16'. FOLIATION JOINTS PRODOMINANT FROM 16'.
				85%	RQD						FROM 15' TO 16', A SUBVERTICAL FOLIATION JOINT, SMOOTH OXIDIZED, TIGHT, WITH TWO 10-DEGREE JOINTS ACROSS FOLIATION, ROUGH, SLIGHTLY OXIDIZED.
30											
40											

Soil Engineer: ____ Driller: GREG MARNEY JR.

Drilling Inspector: ____ Helper: THEO RODRIGUEZ

JOB LOCATION.

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.

SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B38-99
LINE & STA. N:323,518.23
OFFSET E:625,223.30

DEPTH _____ FT ___ FT CASING OUT DATE _____
DEPTH _____ FT ALL CASING OUT DATE _____

DATE. START. 2-22-99
DATE. FINISH 2-23-99

GROUND ELEVATION 176.99
GROUND WATER ELEVATION 170.11 3/24/99

CASING O.D HW I.D _____
SAMPLER O.D 2" I.D _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV · FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											FROM 18.5' TO 19.5' A CURVED FOLIATION JOINT, ROUGH, OXIDIZED, TIGHT, WITH TWO 10-DEGREE JOINTS ACROSS FOLIATION, ROUGH, SOME OXIDATION, TIGHT. (2-65)
10											END OF HOLE 20' PIEZOMETER INSTALLED AT 18'.
20											
30											
40											

Soil Engineer: _____ Driller: GREG MARNEY JR.

Drilling Inspector: _____ Helper: THEO RODRIGUEZ

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B39-99
LINE & STA N:322,835.71
OFFSET E:625,248.43

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-2-99
DATE FINISH 2-4-99

GROUND ELEVATION 179.20
GROUND WATER ELEVATION 172.18 2/5/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	TOPSOIL (6"). DARK
		SS1	0'-2'	6"	2	2	4	2		2'	BROWN SILTY SAND, ORGANIC MATTER. LOOSE, (SM) (11-65)
		SS2	2'-4'	8"	3	4	4	4			
		SS3	4'-6'	10"	9	9	5	5		6'	TAN BROWN SILTY FINE SAND, TRACE GRAVEL. LOOSE TO MEDIUM DENSE. (SM) (7-65)
		SS4	6'-8'	10"	46	48	25	60			
10		SS5	8'-10'	0"	100	/2"					YELLOW BROWN SILTY F-M SAND, TRACE TO SOME GRAVEL, ROCK FRAGMENTS, MICA, COBBLES. VERY DENSE. POSSIBLE SAPROLITIC SOIL (DECOMPOSED ROCK). (SM AND GM)
		SS6	10'-12'	8"	99	96	90	91			
		SS7	12'-14'	12"	30	32	31	31			
		SS8	14'-16'	14"	25	31	30	33		16'	(6-65/5-65)
20		R1	16'-21'	60% REC 52% RQD							GNEISS. LIGHT GRAY SLIGHTLY WEATHERED TO UNWEATHERED, OXIDIZED ON JOINTS TO 28' AND AT 50.9', 61.5', AND 65.5'.
		R2	21'-25'	92% REC 88% RQD							
30		R3	25'-30.5'	96% REC 85% RQD							SOFT TO MODERATELY HARD. FRACTURED FROM 16' TO 18'. FROM 16' TO 16.5' AND 16.8' TO 17.2' TWO SUBVERTICAL FOLIATION JOINTS, SMOOTH. (3-65)
		R4	30.5'-40.5'	99% REC 87% RQD							ROCK QUALITY IMPROVES AT 18'; UNWEATHERED, HARD,
40											

Soil Engineer: ____ Driller: CESAR MORIERA

Drilling Inspector: ____ Helper: MIKE KELLY

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B39-99
LINE & STA N:322,835.71
OFFSET E:625,248.43

DEPTH _____ FT ____ FT CASING OUT DATE _____
DEPTH _____ FT ALL CASING OUT DATE _____

DATE START 2-2-99
DATE FINISH 2-4-99

GROUND ELEVATION 179.20
GROUND WATER ELEVATION 172.18 2/5/99

CASING O.D HW I.D _____
SAMPLER O.D 2" I.D _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											MODERATELY CLOSE JOINT SPACING. FOLIATION AT 60 DEGREES TO SUB-VERTICAL.
40											AT 23.7' A 70-DEGREE FOLIATION JOINT, SMOOTH, MICA
50											AT 45' AND 51.7', TWO 60-DEGREE FOLIATION JOINTS,
10		R5	40.5'-50.5'	98% REC 90% RQD							SMOOTH, TIGHT, WIT A 70-DEGREE JOINT ACROSS FOLIATION.
60											OXIDIZED FROM 61' TO 61.5'. GENERALL GOOD ROCK. (2-65)
20		R6	50.5'-60.5'	96% REC 93% RQD							
		R7	60.5'-65.5'	98% REC 86% RQD						65.5'	
70											END OF HOLE 65.5'
30											
80											
40											

Soil Engineer. _____ Driller: CESAR MOREIRA

Drilling Inspector: _____ Helper: MIKE KELLY

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MB-B40-99
LINE & STA N:323,081.15
OFFSET E:625,270.16

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 1-28-99
DATE FINISH 1-29-99

GROUND ELEVATION 177.77
GROUND WATER ELEVATION 171.43 2/1/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	12"	2	4	4	5		0'-2'	TOPSOIL (3"). DARK GRAY SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	14"	5	10	11	16			RUSTY BROWN SILTY FINE SAND, TRACE TI SOME GRAVEL, COBBLES, BOULDERS. MEDIUM DENSE TO
		SS3	4'-6'	12"	12	14	11	12			
		SS4	6'-8'	2"	10	100	/1"			10'	DENSE. (SM) (6-65)
10		SS5	10'-11.5'	12"	20	37	100	/3"		11.5'	YELLOW BROWN SILTY F-M SAND WITH MICA ROCK FRAGMENTS.
											VERY DENSE. POSSIBLE SAPROLITI SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
20		R1	11.5'-21.5'	90% REC 90% RQD							GNEISS. LIGHT GRAY TO 34', QUARTZITIC FROM 20.5' TO 31.5' MEDIUM GRAY BELOW 34'. WEATHERED TO 32'. FOLIATION AT 30 TO 70 DEGREES. OXIDATION ON JOINT TO 38'.
30		R2	21.5'-31.5'	93% REC 54% RQD							FROM 11.5' TO 20.3' HARD, SLIGHTLY WEATHERED, MODERATELY CLOSE JOINT SPACING. FROM 20.3' TO 20.6' A 60-DEGREE FOLIATION JOINT, ROUGH, TIGHT. FRACTURED, WEATHER ED AND OXIDIZED
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B40-99
LINE & STA N:323,081.15
OFFSET E:625,270.16

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START 1-28-99
DATE. FINISH 1-29-99

GROUND ELEVATION 177.77
GROUND WATER ELEVATION 171.43 2/1/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		R3	31.5'-41.5'	96% REC 72% RQD							ON JOINTS FROM 23' TO 34'. FROM 26.5' TO 30', FOURTEEN 30-DEGREE FOLIATION JOINTS, OXIDIZED, ROUGH. FRIABLE, SOFT FROM 28.5' TO 29.5', POSSIBLE SHEARING. FROM 30.5' TO 31.5', A 70-DEGREE JOINT ACROSS FOLIATION, OXIDIZED, TIGHT WITH TWO 30-DEGREE FOLIATION JOINTS, ROUGH, TIGHT, OXIDIZED.
40											
50											
10		R4	41.5'-51.5'	98% REC 96% RQD							
60											
20		R5	51.5'-61'	98% REC 98% RQD						61'	FROM 23.7' TO 31.5' CLOSE JOINT SPACING. AT 32.5', A 70-DEGREE JOINT ACROSS FOLIATION, ROUGH, OXIDIZED, TIGHT. (3-65) BELOW 34', ROCK QUALITY IMPROVES WITH MODERATELY CLOSE JOINT SPACIN AND WIDE JOINT SPACING BELOW 50.5'. AT 37.5', A 10-DEGREE JOINT ACROSS FOLIATION, OXIDIZED, TIGHT.
70											
30											
80											
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B40-99
LINE & STA. N:323,081.15
OFFSET E:625,270.16

DEPTH _____ FT ____ FT CASING OUT DATE. _____
DEPTH _____ FT ALL CASING OUT DATE _____

DATE. START. 1-28-99
DATE. FINISH 1-29-99

GROUND ELEVATION 177.77
GROUND WATER ELEVATION 171.43 2/1/99

CASING O.D. HW I.D _____
SAMPLER O.D 2" I.D _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6 ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											FROM 48' TO 48.5', A 60-DEGREE FOLIATION JOINTS, SMOOTH, MICA, TIGHT. AT 54.7', A 70-DEGREE FOLIATION JOINT, SMOOTH, TIGHT. (1-65)
10											END OF HOLE 61'
20											
30											
40											

Soil Engineer: _____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: _____ Helper: ALVRO LONDON

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B41-99
LINE & STA N:323,329.79
OFFSET E:625,288.24

DEPTH _____ ft ___ ft CASING OUT DATE: _____
DEPTH _____ ft ALL CASING OUT DATE _____

DATE START 1-27-99
DATE FINISH 1-27-99

GROUND ELEVATION 177.25
GROUND WATER ELEVATION 166.51 2/1/99

CASING OD HW ID _____
SAMPLER OD 2" I.D _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV · FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
	SS1	0'-2'	10"	2	4	2	3		0'-2'	TOPSOIL (3"). DARK BROWN SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
	SS2	2'-4'	2"	100	/2"				4'	RUSTY BROWN SILTY FINE SAND, TRACE GRAVEL. (SM) (7-65) ROLLER BIT FROM 4' TO 7'
	R1	7'-12'	100%	REC						GNEISS. LIGHT GRAY TO 11.5', QUARTZITIC BANDS; MEDIUM GRAY BELOW 11.5'. UNWEATHERED OXIDATION ON JOINT TO 25'. FOLIATION AT 60 DEGREES.
			99%	RQD						
	R2	12'-22'	85%	REC						FROM 7' TO 16', MODERATELY CLOSE T WIDE JOINT SPACING FROM 8.9' TO 9.5', A 70-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT. (1-6=
			71%	RQD						
	R3	22'-25'	100%	REC					25'	FROM 16' TO 22.5', CLOSE JOINT SPACING. FROM 17.7' TO 18.5' A 60-DEGREE FOLIATION JOINT, OXIDIZED, TIGHT. A 10-DEGREE JOINT ACROSS FOLIATION, ROUGH, OPEN; A 75-DEGREE JOINT WITH FOLIATION TREND.
			84%	RQD						

Soil Engineer: _____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: _____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B41-99
LINE & STA N:323,329.79
OFFSET E:625,288.24

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 1-27-99
DATE FINISH: 1-27-99

GROUND ELEVATION 177.25
GROUND WATER ELEVATION 166.51 2/1/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0								TIGHT. (3-65)
										ROCK QUALITY IMPROVES BELOW 22.5'. MODERATELY CLOSE JOINT SPACING. (2-65)
		10								END OF HOLE 25'
		20								
		30								
		40								

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B42-99
LINE & STA. N:322,831.98
OFFSET E:625,338.22

DEPTH ____ ft ____ ft. CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE START: 2-11-99
DATE FINISH: 2-16-99

GROUND ELEVATION 174.93
GROUND WATER ELEVATION 170.48 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV : FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	18"	3	3	3	3		0'-	TOPSOIL (3"). DARK BROWN SILT WITH SAND, ORGANIC MATTER IN TOP 2 FEET. FIRM TO
		SS2	2'-4'	18"	4	6	5	5			
		SS3	4'-6'	18"	5	6	7	9		6'	STIFF. (ML)(11-65)
		SS4	6'-8'	18"	32	33	40	38			YELLOW BROWN SILTY SAND, TRACE TO SOME
10		SS5	8'-10'	18"	27	28	30	32			GRAVEL. VERY DENSE. (SM) (6-65)
		SS6	10'-12'	16"	23	85	27	28			
										15'	
		R1	15'-17'	86% REC 0% RQD							GNEISS. LIGHT TO MEDIUM GRAY. WEATHERED TO 19'. OXIDATION ON JOINTS TO 43'.
20		R2	17'-21.5'	80% REC 79% RQD							SOFT, WEATHERED, FRACTURED FROM 15' TO 17', OXIDIZED. FOLIATION AT 40 DEGREES. (4-65)
		R3	21.5'-26.5'	96% REC 76% RQD							FROM 15.3' TO 15.7' A SUBVERTICAL JOINT, OXIDIZED, FRIABLE, SOFT.
30		R4	26.5'-34'	96% REC 68% RQD							ROCK QUALITY IMPROVES AT 17'. FROM 17' TO 25'. MODERATELY HARD TO HARD, CLOSE TO MODERATELY CLOSE JOINT SPACING.
40											

Soil Engineer: ____ Driller: CESAR MORIERA

Drilling Inspector: ____ Helper: MIKE KELLY

SOIL LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B42-99
LINE & STA N:322,831.98
OFFSET E:625,338.22

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-11-99
DATE FINISH 2-16-99

GROUND ELEVATION 174.93
GROUND WATER ELEVATION 170.48 3/24/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40		R5	34'-42'	91% REC 82% RQD							FOLIATION AT 40 TO 60 DEGREES. SOME SUBHORIZONTAL AND FOLIATION JOINTS, OXIDIZED. A SMOOTH FOLIATION JOINT AT 60 DEGREES, OXIDIZED, AT 19.8' ESSENTIALLY GOOD ROCK. (2-65)
50											
10											
		R6	42'-52'	98% REC 98% RQD							FROM 25' TO 34', CLOSE JOINT SPACING. FOLIATION AT 60 AND 70 DEGREES. 60 AND 70-DEGREE JOINTS ACROSS FOLIATION A 27.5' (SMOOTH) AND 28' (ROUGH), INTERSECTED BY 30 AND 4 -DEGREE JOINTS. SMOOTH 70 AND 60-DEGREE JOINTS, OXIDIZED, AT 33.5' (ACROSS FOLIATION) AND 33.8' (FOLIATIO JOINT). (3-65)
60											
20		R7	52'-60'	92% REC 70% RQD						60'	
70											
30											FROM 34' TO 55', CLOSE TO MODERATEL CLOSE JOINT SPACING. FROM 34' TI 34.5', A ROUGH FOLIATION JOINT AT 70 DEGREES, ALTERATION IN EPIDOTE AND CHLORITE. (1-65
80											
40											BELOW 56', SUB-VERTICAL FOLIATION

Soil Engineer: ____ Driller: CESAR MORIERA

Drilling Inspector: ____ Helper: MIKE KELLY

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET ___ OF ___
LOCATION BRONX, NY
HOLE NO MG-842-99
LINE & STA N:322,831.98
OFFSET E:625,338.22

DEPTH ___ FT ___ FT CASING OUT DATE ___
DEPTH ___ FT ALL CASING OUT DATE ___

DATE, START: 2-11-99
DATE, FINISH: 2-16-99

GROUND ELEVATION 174.93
GROUND WATER ELEVATION 170.48 3/24/99

CASING O.D. HW I.D. ___
SAMPLER O.D. 2" I.D. ___
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											AND CLOSE TO MODERATELY CLOSE JOINT SPACING. FROM 52.2' TO 55.8', A SMOOTH FOLIATION JOINTS AT 60 DEGREES. (2-65)
10											END OF HOLE 60' ORIENTED CORE FROM 25' TO 60'. WATER PRESSURE TESTS IN ROCK FROM 15' TO 60'. PIEZOMETER INSTALLED AT 52'.
20											
30											
40											

Soil Engineer: ___ Driller: CESAR MORIERA

Drilling Inspector: ___ Helper: MIKE KELLY

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET - OF -
LOCATION BRONX, NY
HOLE NO MG-B43-99
LINE & STA N:322,918.19
OFFSET E:625,351.04

DEPTH ____ TO ____ TO CASING OUT DATE ____
DEPTH ____ TO ALT CASING OUT DATE ____

DATE START 1-28-99
DATE FINISH 1-29-99

GROUND ELEVATION 174.84
GROUND WATER ELEVATION 169.62 2/1/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	10"	3	3	4	4		0'-2'	TOPSOIL (3"). DARK BROWN SILTY SAND, ORGANIC MATTER. (SM) (11-65)
		SS2	2'-4'	12"	4	8	7	20		4'	DARK BROWN SILT WITH SAND. STIFF. (ML) (11-65)
		SS3	4'-6'	8"	14	20	16	21			
		SS4	6'-8'	10"	15	16	17	17			RUSTY BROWN SILTY FINE SAND, SOME GRAVEL, COBBLES. (SP-SM AND GP-GM) (6-65)
10		SS5	8'-10'	3"	100	/3"				11'	
		SS6	10'-12'	10"	17	20	45	45			YELLOW BROWN SILTY F-M SAND, WITH GRAVEL, MICA, ROCK FRAGMENTS(GNEISS), COBBLES. DENSE TO VERY DENSE. POSSIBLE SAPROLITIC SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
		SS7	12'-14'	6"	12	15	16	15			
		SS8	14'-16'	8"	21	19	33	45			
		SS9	16'-17'	2"	100	/2"				17'	
20											
		R1	17.5'-27.5'	98% REC 85% RQD							GNEISS. MEDIUM GRAY. SLIGHTLY SCHISTOSE FROM 35' TO 51'. FOLIATION FROM 50 DEGREES TO SUBVERTICAL. QUARTZ BAND FROM 47' TO 48'. OXIDATION ON JOINTS TO 45.5'. FROM 22' TO 23.8', A SUBVERTICAL FOLIATION JOINT, OXIDIZED, SMOOTH, OPEN WITH FOUR 10-DEGREE JOINTS ACROSS FOLIATION, ROUGH, OPEN.
30											
		R2	27.5'-37.5'	98% REC 86% RQD							
		R3	37.5'-40.5'	96% REC 78% RQD							
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B43-99
LINE & STA N:322,918.19
OFFSET E:625,351.04

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 1-28-99
DATE FINISH 1-29-99

GROUND ELEVATION 174.84
GROUND WATER ELEVATION 169.62 2/1/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											
50											
10		R4	40.5'-50.5'	98% REC 84% RQD							
		R5	50.5'-56'	100 % REC 100 % RQD						56'	
60											
20											
70											
30											
80											
40											

FROM 24.5' TO 25.2' AND 25.4' TO 26.25', TWO SUB-VERTICAL FOLIATION JOINTS, SMOOTH, TIGHT.
FROM 31' TO 32.5', FRACTURED ZONE, SOFT, FRIABLE.
FROM 30.6' TO 31.1' AN 80-DEGREE FOLIATION JOINT, ROUGH, OPEN.
FROM 32' TO 32.5', A 70-DEGREE JOINT ACROSS FOLIATION, OXIDIZED, ROUGH.
FROM 33.75' TO 34.1', A 70-DEGREE FOLIATION JOINT, OXIDIZED, SMOOTH, TIGHT.
FROM 34.1' TO 34.8' A 70-DEGREE JOINT ACROSS FOLIATION, OXIDIZED, ROUGH, WTIH A 10-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT

ROCK QUARTZITE IMPROVES FROM 35' TO 38.2'. CLOSELY JOINTED FROM 38.2' TO 42.1'. FROM 38.2' TO 38.9' A FOLIATION JOINT, OXIDIZED, SMOOTH, TIGHT WITH A 10-DEGREE JOINT ACROSS

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B43-99
LINE & STA N:322,918.19
OFFSET E:625,351.04

DEPTH ____ FT ____ IT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 1-28-99
DATE FINISH 1-29-99

GROUND ELEVATION 174.84
GROUND WATER ELEVATION 169.62 2/11/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											FOLIATION, ROUGH.
											FOLIATION JOINTS BELOW 41' ARE SMOOTH, TIGHT. IN GENERAL GOOD ROCK FROM 17' TO 42.1'. (2-65)
10											ROCK QUALITY IMPROVES BELOW 42.1' (1-65)
											END OF HOLE 56'
20											
30											
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B44-99
LINE & STA. N:323,014.73
OFFSET E:625,391.41

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-4-99
DATE FINISH 2-5-99

GROUND ELEVATION 174.13
GROUND WATER ELEVATION ____

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER ____ LBS.
INSIDE LENGTH OF SAMPLER ____ IN

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	ANGLED BOREHOLE DIRECTION: N 82 DEGREES W ANGLE: 60 DEGREE ROLLER BIT TO TOP OF ROCK NOTE: ALL DEPTHS SHOWN AS "DOWN-HOLE" OR NON-VERTICAL
10											
19'											
20		R1	19'-22'	99% REC 55% RQD							GNEISS. LIGHT TO MEDIUM GRAY, SCHISTOSE. FOLIATION AT 30 DEGREES TO SUB-VERTICAL. OXIDATION ON JOINTS TO 25'. CLOSE JOINT SPACING TO 21'. (3-65) MODERATELY CLOSE SPACING FROM 21' TO 96.25'. ROUGH FOLIATION JOINTS PREDOMINATE FROM 19' TO 22' AND BELOW 72'.
30		R2	22'-32'	99% REC 91% RQD							
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO MG-B44-99
LINE & STA N:323,014.73
OFFSET E:625,391.41

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE. START: 2-4-99
DATE. FINISH: 2-5-99

GROUND ELEVATION 174.13
GROUND WATER ELEVATION ____

CASING O.D. HW ____ I.D. ____
SAMPLER O.D. 2" ____ I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER ____ LBS.
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40		R3	32'-42'	99% REC 96% RQD							GENERALLY SMOOTH FOLIATION JOINTS FROM 32' TO 72'. A 50-DEGREE JOINT ACROSS FOLIATION A 87.5'. AT 93.8', A SUB-VERTICAL FOLIATION JOINT, ROUGH, WITH A 10-DEGREE JOINT ACROSS FOLIATION, ROUGH, TIGHT. FROM 95.25' TO 95.75', A SMOOTH SUBVERTICAL JOINT WITH FOLIATION TREND, WITH 20-DE-GREE JOINT ACROSS FOLIATION, TIGHT, ROUGH. CLOSELY TO MODERATELY JOINTED FROM 96.25' TO 100.9'. MODERATELY CLOSE JOINT SPACIN BELOW 100.9'. FROM 96.25' TO 98.25', A SMOOTH 80-DEGREE JOINT ACROSS FOLIATION, TIGHT, WITH FOUR 10-DEGREE JOINTS ACROSS FOLIATION, ROUGH, TIGHT. A SUBVERTICAL FOLIATION JOINT FROM 98.5' TO 99'.
50											
10											
		R4	42'-52'	99% REC 78% RQD							
60											
20											
		R5	52'-62'	99% REC 98% RQD							
70											
30											
		R6	62'-72'	99% REC 90% RQD							
80											
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B44-99
LINE & STA N:323,014.73
OFFSET E:625,391.41

DEPTH ____ FT ____ FT. CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-4-99
DATE. FINISH: 2-5-99

GROUND ELEVATION 174.13
GROUND WATER ELEVATION ____

CASING O.D. HW ____ I.D ____
SAMPLER O.D. 2" ____ I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER ____ LBS.
INSIDE LENGTH OF SAMPLER ____ IN.

HAMMER FALL
CASING ____ SAMPLER ____

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
80		R7	72'-82'	93% REC 93% RQD							IN GENERAL, THE ROCK IS GOOD BELOW 21'. (1-65)
90											
10											
		R8	82'-92'	99% REC 98% RQD							
100											
20											
		R9	92'-102'	99% REC 73% RQD							
		R10	102'-105'	99% REC 99% RQD						105'	
110											END OF HOLE 105'
30											
120											
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED 543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION: BRONX, NY
HOLE NO MG-B45-99
LINE & STA N:323,116.78
OFFSET E:625,374.89

DEPTH ____ TO ____ FT. CASING OUT DATE ____
DEPTH ____ TO ____ FT. ALL CASING OUT DATE ____

DATE START: 2-8-99
DATE FINISH: 2-10-99

GROUND ELEVATION 176.79
GROUND WATER ELEVATION 168.24 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	18"	12	14	15	17		0'-2'	TOPSOIL(3). DARK GRAY SILT WITH SAND, ORGANIC MATTER. (ML)(11-65)
		SS2	2'-4'	18"	4	5	5	6		4'	RUSTY BROWN SILTY FINE SAND. (SM) (7-65)
		SS3	4'-6'	18"	10	11	11	11		6'	DARK GRAY SILT WIT FINE SAND. (ML) (11-65)
		SS4	6'-8'	18"	5	6	9	8		8'	YELLOW BROWN SILTY F-M SAND. MEDIUM DENSE. (SM) (7-65)
		SS5	8'-8.1'	NR	100	/1"				14.5'	POSSIBLE SAPROLITI SOIL. BOULDERS. DENSE. (SM AND GM) (6-65/5-65)
10		SS6	10'	NR	100	/0"					
20		R1	14.5'-19.5'	93%	REC						GNEISS. MEDIUM GRAY. SLIGHTLY WEATHERED TO UN-WEATHERED. FOLIATION FROM 60 TO 80 DEGREES. OXIDATION ON JOINT TO 20.5', AT 38' AND 49.5'. A 70 DEGREE FOLIATION JOINT, OXIDIZED, FROM 16.8 TO 17.4'. CLOSELY JOINTED FROM 16' T 18.5', 31.6' TO 38', 45' TO 50'. MODERATELY CLOSE JOINT SPACING IN THE REST OF THE CORE. (2-65/1-65)
				81%	RQD						
		R2	19.5'-21.5'	99%	REC						
				98%	RQD						
		R3	21.5'-22.5'	68%	REC						
				68%	RQD						
30		R4	22.5'-32.5'	96%	REC						
				93%	RQD						
40											

Soil Engineer: ____ Driller: CESAR MORIERA

Drilling Inspector: ____ Helper: MIKE KELLY

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED 543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B45-99
LINE & STA N:323,116.78
OFFSET E:625,374.89

DEPTH ____ FT ____ IN CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-8-99
DATE FINISH 2-10-99

GROUND ELEVATION 176.79
GROUND WATER ELEVATION 168.24 3/24/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40		R5	32.5'-42.5'	99% REC 80% RQD							
50											
10		R6	42.5'-50'	99% REC 77% RQD							
		R7	50'-55'	99% REC 99% RQD						55'	
60											END OF HOLE 55' ORIENTED CORE FROM 20' TO 55'. WATER PRESSURE TESTS IN ROCK FROM 15' TO 55'. PIEZOMETER INSTALLED AT 53'.
20											
70											
30											
80											
40											

Soil Engineer: ____ Driller: CESAR MORIERA

Drilling Inspector: ____ Helper: MIKE KELLY

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO. MG-846-99
LINE & STA N:323,215.85
OFFSET E:625,387.39

DEPTH ____ FT ___ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 1-25-99
DATE FINISH: 1-26-99

GROUND ELEVATION 175.44
GROUND WATER ELEVATION 166.62 2/1/99

CASING O.D. HW ID ____
SAMPLER O.D. 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	8"	8	8	9	14		0'-2'	TOPSOIL (1.5"). DARK GRAY SILTY SAND, ORGANIC MATTER. MEDIUM DENSE. (SM) (11-65)
		SS2	2'-4'	18"	7	10	12	21			
		SS3	4'-6'	2"	38	56	69	100		6'	RUSTY BROWN SILTY FINE SAND, TRACE GRAVEL, COBBLES (SM) (6-65)
		SS4	6'-7'	9"	28	100	/3"				
10		R1	7.5'-12.5'	17%	REC	BOU	LDE	RS			YELLOW BROWN SILTY F-M SAND, MICA, ROCK FRAGMENTS (GNIESS), COBBLES AND BOULDERS. POSSIBLE SAPROLITI SOIL. (SM AND GM) (6-65/5-65)
		R2	12.5'-13.5'	50%	REC	BOU	LDE	RS			
		SS5	13.5'-14'	6"	100	/6"				14'	
20		R3	15.5'-20'	100 % 98% RQD		REC					GNEISS. MEDIUM GRAY. QUARTZITIC FROM 39' TO 45', 48' TO 50'. FOLIATION AT 70 DEGREES TO SUB-VERTICAL. OXIDATIO ON JOINTS UP TO 37.5'. FROM 15.75' TO 16.5', A 70-DEGREE FOLIATION JOINT, SLIGHTLY OXIDIZED, SMOOTH. FROM 22.8' TO 24.3' AN 80-DEGREE FOLIATION JOINT, OXIDIZED, ROUGH.
30		R4	20'-30'	98% 93% RQD		REC					
		R5	30'-40'	100 % 96% RQD		REC					
40											

Soil Engineer: ____ Driller: GUS SURI

Drilling Inspector: ____ Helper: STEVEN LUEDDEKE

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO. MG-B46-99
LINE & STA. N:323,215.85
OFFSET E:625,387.39

DEPTH _____ FT ____ FT CASING OUT DATE. _____
DEPTH _____ FT. ALL CASING OUT DATE. _____

DATE. START: 1-25-99
DATE. FINISH: 1-26-99

GROUND ELEVATION 175.44
GROUND WATER ELEVATION 166.62 2\|1\|99

CASING O.D HW I.D _____
SAMPLER O.D 2" I.D. _____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV . FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											FROM 45' TO 48', A SUBVERTICAL FOLIATION JOINT, SMOOTH, FRIABLE, SOFT, MUSCOVITE. IN GENERAL GOOD ROCK, MODERATELY JOINTED. (1-65)
50											
10		R6	40'-50'	100 %	REC					50'	
				88%	RQD						END OF HOLE 50'
60											
20											
70											
30											
80											
40											

Soil Engineer: _____ Driller: GUS SURI

Drilling Inspector: _____ Helper: STEVEN LUEDDEKE

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 1
LOCATION BRONX, NY
HOLE NO MG-B47-99
LINE & STA N:323,321.30
OFFSET E:625,396.15

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____
DATE, START 1-25-99
DATE, FINISH 1-26-99
GROUND ELEVATION 172.97
GROUND WATER ELEVATION 163.05 2/1/99

CASING O.D HW ____ I.D ____
SAMPLER O.D 2" ____ I.D ____
DIAMOND BIT SIZE NQ
WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN
HAMMER FALL CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV FEET	SAMPLE RECOVERY	BLOWS PER 6 ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	18"	4	5	6	6		0'-2'	TOPSOIL (3"). DARK GRAY SILTY SAND, TRACE GRAVEL, ORGANIC MATTER. (SM) (11-65)
		SS2	2'-4'	18"	10	10	6	7			
		SS3	4'-6'	12"	18	32	56	100			RUSTY BROWN SILTY F-M SAND, SOME GRAVEL, COBBLES AND BOULDERS. MEDIUM DENSE TO VERY DENSE. (SP-SM AND GP-GM) (6-65) ROLLER BIT FROM 6.5' TO 8', FROM 13.5' TO 15'
		SS4	6'-6.5'	5"	100	/5"					
10											
		R1	8'-13'	14% REC						13'	
		SS5	13'-13.5'	3"	100	/3"					
										15'	YELLOW BROWN SILTY F-M SAND, MICA, ROCK FRAGMENTS, COBBLES. VERY DENSE POSSIBLE SAPROLITI SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65/5-65)
20		R2	15'-20'	95% REC						20'	GNEISS. LIGHT GRAY QUARTZ BAND FROM 17.5' TO 18.5'. WEATHERED, FRACTURED, OXIDIZED SOFT AND FRIABLE FROM 15' TO 17'. (3-65) MODERATELY JOINTED FROM 17' TO 20', STEEP FOLIATION. (1-65)
				78% RQD							
30											END OF HOLE 20'
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 3
LOCATION BRONX, NY
HOLE NO MG-B48-99
LINE & STA N:322,750.80
OFFSET E:625,279.85

DEPTH ____ FT ____ FT. CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 1-28-99
DATE. FINISH: 2-1-99

GROUND ELEVATION 179.30
GROUND WATER ELEVATION 171.05 2/1/99

CASING OD HW ID ____
SAMPLER O D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0		SS1	0'-2'	8"	6	7	7	7		0'-	TOPSOIL (2"). DARK GRAY SILT WITH SAND, ORGANIC
		SS2	2'-4'	3"	9	9	12	12		4'	MATTER. STIFF. (ML) (11-65)
		SS3	4'-6'	8"	16	23	30	100 /5"			RUSTY BROWN SILTY F-M SAND, TRACE TO
		SS4	6'-8'	4"	87	100	/5"				SOME GRAVEL,
10		SS5	8'-10'	5"	80	92	96	100 /2"			COBBLES. (SM) (6-65)
		SS6	10'-12'	3"	100	/4"					
										15'	
		SS7	15'-17'	3"	75	100	/1"				GREENISH GRAY SILT F-C SAND, LITTLE T SOME GRAVEL,
		SS8	17'-19'	5"	32	44	46	50			COBBLES, BOULDERS. VERY DENSE. TILL
20		SS9	19'-21'	8"	45	42	40	38			MATERIAL. (SM AND GM) (6-65)
	SS	10	21'-23'	10"	45	52	55	72		23'	
		R1	23'-29'	92% REC 25% RQD							GNEISS. MEDIUM GRAY. STEEP FOLIATION (60 DEGRE TO SUBVERTICAL). OXIDATION ON JOINT TO 60.5'.
30											FROM 23' TO 36.5', SOFT TO MEDIUM HARD, OXIDIZED, FRACTURED FROM 23' TO 28'. A SUB- VERTICAL FOLIATION JOINT FROM 31' TO 32', SMOOTH,
		R2	29'-39'	98% REC 68% RQD							OXIDIZED, TIGHT.
40											

Soil Engineer: ____ Driller: CESAR MORIERA

Drilling Inspector: ____ Helper: MIKE KELLY

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 3
LOCATION BRONX, NY
HOLE NO. MG-B48-99
LINE & STA. N:322,750.80
OFFSET E:625,279.85

DEPTH ____ ft ____ ft CASING OUT DATE ____
DEPTH ____ ft ALL CASING OUT DATE ____

DATE START 1-28-99
DATE FINISH 2-1-99

GROUND ELEVATION 179.30
GROUND WATER ELEVATION 171.05 2/1/99

CASING O.D. HW ID ____
SAMPLER O.D. 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											WITH A 10-DEGREE JOINT ACROSS FOLIATION, OXIDIZED, ROUGH. (4-65/3-65)
		R3	39'-43'	93% REC 52% RQD							MODERATELY CLOSE JOINT SPACING FROM 36.5' TO 38'. CLOSELY JOINTED FROM 38' TO 59' AND BELOW 63'. SUBVERTICAL FOLIATION JOINT, IRREGULAR, CURVED, SMOOTH, CHLORITE, ALTERATION, TIGHT. FROM 36.2' TO 37'. FROM 43' TO 48', FIVE SUBVERTICAL FOLIATION JOINTS, SMOOTH, OXIDIZED, OPEN, WITH SIX 10 TO 20-DEGREE JOINTS ACROSS FOLIATION, OXIDIZED, OPEN. FROM 51.5' TO 53.4', CLOSELY JOINTED WITH SUBVERTICAL FOLIATION JOINTS, SMOOTH, OXIDIZED, OPEN, WITH FOUR 5-DEGREE JOINTS ACROSS FOLIATION, ROUGH, OXIDIZED, OPEN. AT 55.5' TWO 60-DEGREE FOLIATION JOINTS, SMOOTH, OXIDIZED, TIGHT.
50											
10		R4	43'-51'	70% REC 30% RQD							
		R5	51'-56'	96% REC 50% RQD							
MO											
20		R6	56'-60'	56% REC 37% RQD							
		R7	60'-66'	94% REC 55% RQD							
70											
30		R8	66'-70'	98% REC 45% RQD						70'	
N											
80											
40											

Soil Engineer: ____ Driller: CESAR MORIERA

Drilling Inspector: ____ Helper: MIKE KELLY

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 3 OF 3
LOCATION BRONX, NY
HOLE NO MG-B48-99
LINE & STA N:322,750.80
OFFSET E:625,279.85

DEPTH ____ ft ____ in CASING OUT DATE: ____
DEPTH ____ ft ALL CASING OUT DATE: ____

DATE START: 1-28-99
DATE FINISH: 2-1-99

GROUND ELEVATION 179.30
GROUND WATER ELEVATION 171.05 2/11/99

CASING OD HW ID ____
SAMPLER OD 2" I.D. ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0								ROCK QUALITY IMPROVES FROM 59' TO 63' WITH MODERATEL CLOSE JOINT SPACING. (3-65/2-65) ROCK CLASS FROM 36.5' TO 63'.
		10								BELOW 63', ROCK IS CLOSELY JOINTED. (3-65) FROM 63.5' TO 64.5' SIX SMOOTH 50-DE-DEGREE FOLIATION JOINTS, TIGHT. FROM 66' TO 66.9', A 60-DEGREE FOLIATION JOINT, SMOOTH TIGHT WITH ONE 50-DEGREE JOINT ACROS FOLIATION, SMOOTH, OPEN. FROM 68.25' TO 69' AN 80-DEGREE JOINT ACROSS FOLIATION, IRREGULAR, ROUGH, TIGHT.
		20								
		30								END OF HOLE 70'
		40								

Soil Engineer: ____ Driller: CESAR MORIERA

Drilling Inspector: ____ Helper: MIKE KELLY

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B49-99
LINE & STA N:322,798.68
OFFSET E:624,883.11

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START 2-10-99
DATE FINISH 2-11-99

GROUND ELEVATION 194.48
GROUND WATER ELEVATION 179.51 3/16/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	
		SS1	0'-2'	14"	1	1	2	2		2'	TOPSOIL (6"). DARK BROWN SILTY FINE SAND, ORGANIC MATTER. (SM) (11-65
		SS2	2'-4'	16"	2	2	2	4			
		SS3	4'-6'	15"	5	7	12	14			RUSTY BROWN SILTY FINE SAND, TRACE T LITTLE GRAVEL FROM 8' TO 20'; WITH SOME GRAVEL BELOW 20'.
		SS4	6'-8'	12"	17	18	20	22			
10		SS5	8'-10'	16"	21	19	20	21			MEDIUM DENSE TO DENSE. (SM AND GP) (6-65)
		SS6	15'-16'	6"	57	100	/6"				
20		SS7	20'-22'	12"	29	44	47	56			
		SS8	25'-26'	8"	49	100	/5"			25'	YELLOW BROWN SILTY F-M SAND, MICA, ROCK FRAGMENTS (GNEISS), COBBLES AND BOULDERS. VERY DENSE. POSSIBLE SAPROLITIC SOIL (DECOMPOSED ROCK) (SM AND GM) (6-65/5-65)
30		SS9	30'-30.5'	3"	100	/5"				34'	
		R1	34'-36'	96% REC 56% RQD							GNEISS. MEDIUM GRAY QUARTZITIC FROM 34 TO 56'. SEVERAL QUARTZITIC BANDS
		R2	36'-37'	66% REC 0% RQD							
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET — OF —
LOCATION: BRONX, NY
HOLE NO: MG-B49-99
LINE & STA: N:322,798.68
OFFSET: E:624,883.11

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 2-10-99
DATE FINISH: 2-11-99

GROUND ELEVATION: 194.48
GROUND WATER ELEVATION: 179.51 2/15/99

CASING O.D. HW I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE: NQ

WEIGHT OF HAMMER: 300-140 LBS
INSIDE LENGTH OF SAMPLER: 24 IN.

HAMMER FALL: CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										
40										BELOW 60'. FOLIATION IN-
										DISTINCT FROM 34'
										TO 55' AND BELOW
	R3	37'-45'	93% REC							66'.
			81% RQD							FROM 55' TO 66',
										FOLIATION AT 30 TO
50										50 DEGREES.
10										OXIDATION ON JOINT
										TO 44'.
										FROM 34' TO 37',
										ROCK IS WEATHERED,
										OXIDIZED, FRACTURE
	R4	45'-55'	97% REC							AND SOFT FROM 36'
			88% RQD							TO 37'.
										(3-65/4-65)
60										
20										ROCK QUALITY IM-
										PROVES FROM 37' TO
										59', 67' TO 75',
										WHERE ROCK IS
										MODERATELY JOINTED
	R5	55'-65'	99% REC							AT 54' AND 55.8',
			76% RQD							TWO SUBVERTICAL
										JOINTS WITH FOLIA-
70										TION TREND, SMOOTH
30										AND 5-DEGREE JOINT
										ACROSS FOLIATION,
										SMOOTH. (2-65)
										ROCK IS CLOSELY
										JOINTED FROM 59'
	R6	65'-75'	99% REC							TO 67'. (3-65)
			84% RQD						75'	
80										
40										END OF HOLE 75'

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 2
LOCATION BRONX, NY
HOLE NO MG-B50-99
LINE & STA. N:322,846.45
OFFSET E:624,486.32

DEPTH ____ TO ____ FT CASING OUT DATE ____
DEPTH ____ TO ALL CASING OUT DATE ____

DATE START: 2-12-99
DATE FINISH: 2-15-99

GROUND ELEVATION 193.62
GROUND WATER ELEVATION 186.25 3/24/99

CASING O.D HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV - FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0 to 6	6-12	12-18	18-24	DENSITY OR CONSIST MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	
		SS1	0'-2'	14"	1	1	1	1		2'	TOPSOIL (3"). DARK BROWN SILTY SAND, ORGANIC MATTER. LOOSE. (SM) (11-65)
		SS2	2'-4'	18"	5	7	12	20			
		SS3	4'-5.2'	5"	32	40	100	/3"		7'	RUSTY BROWN SILTY FINE SAND, TRACE TO SOME GRAVEL. DENSE TO VERY DENSE. (SM) (6-65)
10											
		R1	7'-15'	89% REC 58% RQD							GNEISS. LIGHT GRAY MODERATELY HARD TO HARD. FOLIATION AT 40 TO 80 DEGREES. OXIDATION ON JOINTS TO 52'.
20											FROM 7' TO 9.5'. ROCK IS FRACTURED, OXIDIZED ON JOINTS. MODERATELY WEATHERED. AT 10.25', TWO 45-DEGREE JOINTS WITH FOLIATION TREND, HALF INCH APART, SMOOTH, OXIDATION. (4-65/3-65)
		R2	15'-25'	100 % REC 93% RQD							
30											
		R3	25'-35'	100 % REC 85% RQD							
40											

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 2 OF 2
LOCATION BRONX, NY
HOLE NO MG-B50-99
LINE & STA N:322,846.45
OFFSET E:624,486.32

DEPTH ____ FT ____ FT. CASING OUT DATE: ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE. START: 2-12-99
DATE. FINISH: 2-15-99

GROUND ELEVATION 193.62
GROUND WATER ELEVATION 186.25 3/24/99

CASING OD HW ID ____
SAMPLER OD 2" ID ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0											
40											ROCK QUALITY IMPROVES BELOW 9.5'. MODERATELY CLOSE JOINT SPACING EXCEPT FROM 45' TO 55' WHERE ROCK IS CLOSELY JOINTED. FROM 45.7' TO 46.5', TWO JOINTS (50 AND 70 DEGREES) INTERSECTING EACH OTHER, OXIDIZED.
		R4	35'-45'	98% REC							
				93% RQD							
50											
10											
		R5	45'-55'	100 % REC							A 70-DEGREE FOLIATION JOINT, SMOOTH, OXIDIZED, FROM 46.5' TO 47'. AT 71' AND 76', TWO 50-DEGREE JOINTS ACROSS FOLIATION, ROUGH, ALTERED IN CHLORITE. AT 79.5', A 70-DEGREE JOINT ACROSS FOLIATION, ROUGH, ALTERED IN CHLORITE. (1-65/2-65)
				78% RQD S							
60											
20											
		R6	55'-65'	100 % REC							
				100 % RQD							
70											
30											
		R7	65'-75'	100 % REC							PIEZOMETER INSTALLED AT 70'.
				96% RQD							
80		R8	75'-80'	100 % REC							
40				88% RQD						80'	END OF HOLE 80'

Soil Engineer: ____ Driller: GREG MARNEY

Drilling Inspector: ____ Helper: GREG WILLIAMS

JOB LOCATION

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99018

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 1
LOCATION BRONX, NY
HOLE NO MG-B51-99
LINE & STA N:323,583.36
OFFSET E:625,500.11

DEPTH ____ FT ____ FT CASING OUT DATE ____
DEPTH ____ FT ALL CASING OUT DATE ____

DATE START: 3-17-99
DATE FINISH: 3-18-99

GROUND ELEVATION 166.78
GROUND WATER ELEVATION 164.21 3/24/99

CASING O.D. HW I.D ____
SAMPLER O.D 2" I.D ____
DIAMOND BIT SIZE NQ

WEIGHT OF HAMMER 300-140 LBS
INSIDE LENGTH OF SAMPLER 24 IN

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	TOPSOIL (4"). DARK BROWN SILTY FINE
		SS1	1'-3'	6"	3	6	4	4		3'	SAND, ORGANIC MATTER, TRACE GRAVEL. LOOSE. (SM) (11-65)
		SS2	4'-6'	12"	4	6	5	8		6'	TAN BROWN SILTY FINE SAND. MEDIUM DENSE. (SM) (7-65)
		SS3	7'-9'	6"	12	14	31	30			
10											GREENISH GRAY SILTY
		SS4	10'-12'	NR	20	17	12	14		13'	SAND, TRACE GRAVEL, DENSE. (SM) (7-65)
		SS5	13'-15'	14"	17	20	31	41			YELLOW/ORANGE BROWN
		SS6	16'-16.2'	4"	100	/3"					TO DARK GRAY SILTY F-M SAND, TRACE
										17'	GRAVEL, MICA, ROCK FRAGMENTS. VERY DENSE. POSSIBLE SAPROLITIC SOIL (DECOMPOSED ROCK). (SM AND GM) (6-65)
20		R1	17'-22'	75%	REC					22'	GNEISS. LIGHT GRAY, HARD, WEATHERED. FOLIATION AT 70 DEGREES TO SUBVERT-
				75%	RQD						ICAL. ONE HORIZON- TAL JOINT, OXIDIZED, ROUGH. DRILLING ROD DROPP- ED RAPIDLY FROM 21' TO 21.5' OF DEPTH. GENERALLY MASSIVE. (2-65)
30											END OF HOLE 22' PERMEABILITY TESTS IN SOIL. MONITORING WELL INSTALLED AT 16'.
40											

Soil Engineer: ____ Driller: REYNOLDS BRIDGPAL

Drilling Inspector: ____ Helper: ALVRO LONDON

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99244

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 1
LOCATION BRONX, NY
HOLE NO MG-B52-99
LINE & STA. N:324006.96
OFFSET E:625455.73

DEPTH ____ FT. ____ FT. CASING OUT DATE: ____
DEPTH ____ FT. ALL CASING OUT DATE: ____

DATE. START: 7-23-99
DATE. FINISH: 7-24-99

GROUND ELEVATION 163.71
GROUND WATER ELEVATION 160.57 7/26/99

CASING O.D. HX I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE ____

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	TOPSOIL/HUMUS(10")
		SS1	1'-3'	1"	3	3	3	3		3'	GRAY SILT WITH FINE SAND, SOFT (ML) (11-65)
		SS2	4'-6'	20"	4	3	3	5		6'	GRAY TO TAN BROWN SILTY FINE SAND, LOOSE, TRACE MICA, (SM) (7-65)
		SS3	7'-9'	18"	10	6	12	40		10'	GRAY FINE SAND, WITH SOME SILT, TRACE GRAVEL, MICA, MEDIUM DENSE TO DENSE. (SM) (7-65)
10		SS4	10'-12'	6"	2	1	2	3			
		SS5	13'-15'	8"	5	3	11	20		16'	YELLOW BROWN SILTY FINE TO MEDIUM SAND, TRACE GRAVEL, MICA, ROCK FRAGMENTS, MEDIUM DENSE TO DENSE. (SM AND GM) (6-65)
		SS6	16'	0"	100	/0"					
20											END OF HOLE 16'
											PERMEABILITY TESTS IN SOIL.
											MONITORING WELL INSTALLED AT 16'.
30											
40											

Soil Engineer: ____ Driller: SAL LAURENZA

Drilling Inspector: ____ Helper: JOHN OLMO

MOSHLOU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99244

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET OF
LOCATION BRONX, NY
HOLE NO. MG-B53-99
LINE & STA. N:324340.42
OFFSET E:625139.18

DEPTH ____ FT. ____ FT. CASING OUT DATE: ____
DEPTH ____ FT. ALL CASING OUT DATE: ____

DATE. START: 7-27-99
DATE. FINISH: 7-27-99

GROUND ELEVATION 174.56
GROUND WATER ELEVATION 168.59 7/28/99

CASING O.D. HX I.D ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE ____

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
		0							0'-	TOPSOIL/HUMUS (8") YELLOW BROWN TO BROWN SILTY FINE SAND, TRACE GRAVEL, MOTTLED, LOOSE TO DENSE. (SM) (7-65)
	SS1	1'-3'	18"	2	3	3	3			
	SS2	4'-6'	16"	7	17	24	31		6'	YELLOW BROWN SILTY FINE TO MEDIUM SAND, TRACE GRAVEL, MICA, ROCK FRAGMENTS, DENSE. (SM AND GM) (6-65)
	SS3	7'-9'	8"	24	24	17	17		9.5'	
	SS4	9.5'	0"	100	/2"					END OF HOLE 9.5'
		10								PERMEABILITY TESTS IN SOIL.
		20								MONITORING WELL INSTALLED AT 9.5'.
		30								
		40								

Soil Engineer: ____ Driller: SAL LAURENZA

Drilling Inspector: ____ Helper: JOHN OLMO

JOB LOCATION:
MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99244

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 1
LOCATION BRONX, NY
HOLE NO. MG-B54-99
LINE & STA. N:323722.17
OFFSET E:625513.99

DEPTH ____ FT. ____ FT. CASING OUT DATE: ____
DEPTH ____ FT. ALL CASING OUT DATE: ____

DATE. START: 7-21-99
DATE. FINISH: 7-22-99

GROUND ELEVATION 163.65
GROUND WATER ELEVATION 158.70 7/28/99

CASING O.D. HX I.D. ____
SAMPLER O.D. 2" I.D. ____
DIAMOND BIT SIZE ____

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	TOPSOIL/HUMUS/ROOTS (12"). TAN BROWN SILTY FINE TO
		SS1	1'-3'	18"	6	4	4	8		4'	MEDIUM SAND, TRACE MICA, LOOSE. (SM) (7-65)
		SS2	4'-6'	20"	3	3	7	9			GREENISH BROWN GRAY SILTY FINE SAND,
		SS3	7'-9'	18"	7	7	8	8			TRACE GRAVEL, MEDIUM DENSE. (SM) (7-65)
10		SS4	10'-12'	18"	7	10	12	14		12'	
		SS5	14'-16'	16"	20	80	80	91			YELLOW BROWN TO BROWN SILTY FINE TO
		SS6	16'	0"	100	/0"				16'	MEDIUM SAND, TRACE GRAVEL, MICA, ROCK FRAGMENTS, DENSE. (SM AND GM) (6-65)
20											END OF HOLE 16'
											PERMEABILITY TESTS IN SOIL.
											MONITORING WELL INSTALLED AT 15.5'.
30											
40											

Soil Engineer: ____ Driller: SAL LAURENZA

Drilling Inspector: ____ Helper: JOHN OLMO

JOB LOCATION:

MOSHOLU GOLF COURSE
VAN CORTLANDT PARK
CONTRACT HED-543

L.99244

WGI Warren George Inc.
SUBSURFACE EXPLORATION

FOR: METCALF&EDDY-HAZEN AND SAWYER

SHEET 1 OF 1
LOCATION BRONX, NY
HOLE NO. MG-B55-99
LINE & STA N:323616.50
OFFSET E:624554.67

DEPTH _____ FT. ____ FT. CASING OUT DATE: _____
DEPTH _____ FT. ALL CASING OUT DATE: _____

DATE. START: 7-20-99
DATE. FINISH: 7-21-99

GROUND ELEVATION 187.85
GROUND WATER ELEVATION 178.61 7/28/99

CASING O.D. HX I.D. _____
SAMPLER O.D. 2" I.D. _____
DIAMOND BIT SIZE _____

WEIGHT OF HAMMER 300-140 LBS.
INSIDE LENGTH OF SAMPLER 24 IN.

HAMMER FALL
CASING 24" SAMPLER 30"

	CASING BLOWS PER FOOT	SAMPLE NUMBER	SAMPLE DEPTHS ELEV. / FEET	SAMPLE RECOVERY	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	DENSITY OR CONSIST. MOISTURE	PROFILE CHANGE DEPTH	FIELD IDENTIFICATION OF SOIL
0										0'-	
		SS1	1'-3'	18"	7	8	8	8			TOPSOIL (8"). TAN BROWN TO GRAY SILTY FINE SAND, TRACE FINE GRAVEL, MICA.
		SS2	4'-6'	20"	10	10	13	20		6'	MEDIUM DENSE. (SM) (7-65)
		SS3	7'-9'	18"	18	14	15	18		10.	YELLOW BROWN TO
10		SS5	10'-10.75'	4"	21	100	/3"			75'	BROWN SILTY FINE TO MEDIUM SAND, TRACE GRAVEL, MICA, ROCK FRAGMENTS, DENSE. (SM AND GM) (6-65)
											END OF HOLE 10.75'
											PERMEABILITY TESTS IN SOIL.
20											MONITORING WELL INSTALLED AT 10'.
30											
40											

Soil Engineer: _____ Driller: BAL LAURENZA

Drilling Inspector _____ Helper: JOHN OLMO

APPENDIX B

AIR TRACK BORING DATA

AIR TRACK BORINGS

AIR TRACK NO.	NORTHING	EASTING	ELEVATION	DEPTH TO ROCK	ROCK ELEVATION
AT-1-99	323,231.34	625,305.43	177.08	15.0	162.1
AT-2-99	323,287.15	625,125.73	180.82	14.0	166.8
AT-3-99	323,338.53	624,960.29	184.97	12.0	173.0
AT-4-99	323,317.85	624,836.76	189.79	4.0	185.8
AT-5-99	323,367.50	624,683.17	192.19	3.0	189.2
AT-6-99	323,359.03	624,565.00	193.65	7.0	186.7
AT-7-99	323,184.34	624,516.58	196.16	6.5	189.7
AT-8-99	322,987.27	624,510.54	195.61	6.0	189.6
AT-9-99	322,970.92	624,634.44	196.32	12.0	184.3
AT-10-99	323,198.40	624,720.01	193.80	4.0	189.8
AT-11-99	322,933.85	624,896.02	195.69	30.0	165.7
AT-12-99	323,110.38	624,965.17	192.19	11.0	181.2
AT-13-99	322,959.60	624,999.33	195.74	31.0	164.7
AT-14-99	323,095.14	625,134.66	183.81	13.0	170.8
AT-15-99	322,948.07	625,239.02	178.66	21.5	157.2
AT-16-99	323,273.77	625,244.18	178.58	13.0	165.6
AT-17-99	323,086.88	624,347.88	194.96	14.5	180.5
AT-18-99	323,262.25	624,412.03	198.80	4.0	194.8
AT-19-99	323,142.66	624,281.03	195.30	12.0	183.3
AT-20-99	322,812.53	624,821.34	193.08	36.0	157.1
AT-21-99	322,794.33	624,710.90	193.51	10.0	183.5
AT-22-99	322,841.98	624,912.32	196.62	44.0	152.6
AT-23-99	322,838.48	624,984.86	197.17	40.0	157.2
AT-24-99	323,001.44	624,401.01	194.23	5.0	189.2
AT-25-99	323,236.84	624,710.91	194.27	4.5	189.8
AT-26-99	322,964.98	624,719.76	195.63	13.0	182.6
AT-27-99	323,044.78	624,845.92	193.96	21.5	172.5
AT-28-99	323,248.76	624,911.78	189.30	21.0	168.3
AT-29-99	323,230.39	625,061.33	187.08	18.0	169.1
AT-30-99	322,952.81	625,064.00	189.82	22.0	167.8
AT-31-99	322,974.08	625,306.95	176.98	20.0	157.0
AT-32-99	322,971.13	624,796.17	195.22	17.0	178.2
AT-33-99	322,779.92	625,062.84	192.43	31.0	161.4
AT-34-99	322,766.35	624,936.30	197.30	38.0	159.3
AT-35-99	322,755.93	624,834.52	193.12	33.0	160.1

APPENDIX C

TEST PIT LOGS

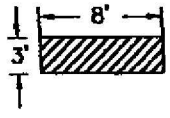
TEST PIT FIELD LOG

Warren George, Inc. Foot of Jersey Ave. Jersey City, NJ 07303	PROJECT DESCRIPTION Mosholu GC LOCATION Bronx, NY	TEST PIT No. MG-TP1-99 FILE No. MGTP199.DWG DATE 9 Mar. 99
ENGINEER R. Kantor WEATHER 30° F, Sunny	EXCAVATION EQUIPMENT CONTRACTOR Smith Bros. OPERATOR John Smith MAKE Nagano MODEL NS-35 CAPACITY 0.5 cu.yd. REACH 12 ft.	GROUND ELEV. 181.36 TIME STARTED 0815 3/9/99 TIME COMPLETED 0900 3/9/99

DEPTH	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDER COUNT QTY. CLASS	REMARK No.
0	Top 6" Topsoil	E	2/A	
1'	3' Wide	E	1/A 2/B	
2'	Brown–tan F–C sand, some silt, little to tr. cobbles and boulders, moist to wet (SM) (6–65)	E	1/C	
3'		E	3/A	
4'		E	2/A	
5'		E	3/A	
6'	Water at 6.5' ▽	D	6/A	Saprolitic
7'	Brown–tan silty F–M sand, some gravel, mica, rock fragments, possible saprolitic soil (SM/GM) (6–65/5–65)			
8'	Bottom of excavation 7.5 feet Sample taken at 7.5 feet			
9'	Approximate vertical walls			
10'				
11'				
12'				
13'				
14'				

REMARKS:

TEST PIT PLAN



VOLUME= 6.67cu.yd.

P:\1302NY\MGTP199.DWG

LEGEND: BOULDER COUNT

SIZE RANGE CLASSIFICATION	LETTER DESIGNATION
6"–18"	A
18"–36"	B
36" and Larger	C

PROPORTIONS USED

TRACE (TR.) 0–10%
LITTLE (LI.) 10–20%
SOME (SO) 20–35%
AND 35–50%

ABBREVIATIONS

F–FINE
M–MEDIUM
C–COARSE
F/M–FINE TO MEDIUM
F/C–FINE TO COARSE
V–VERY
GR.–GRAY
BN.–BROWN
YEL.–YELLOW

EXCAVATION EFFORT

E_____EASY
M_____MODERATE
D_____DIFFICULT
GROUNDWATER

ELAPSED TIME TO READING G.W. (HRS.)

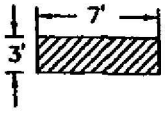
TEST PIT FIELD LOG

Warren George, Inc. Foot of Jersey Ave. Jersey City, NJ 07303	PROJECT DESCRIPTION Mosholu GC LOCATION Bronx, NY	TEST PIT No. MG-TP2-99 FILE No. MGTP299.DWG DATE 9 Mar. 99
ENGINEER R. Kantor WEATHER 30° F, Sunny	EXCAVATION EQUIPMENT CONTRACTOR Smith Bros. OPERATOR John Smith MAKE Nagano MODEL NS-35 CAPACITY 0.5 cu.yd. REACH 12 ft.	GROUND ELEV. 194.84 TIME STARTED 0915 3/9/99 TIME COMPLETED 1030 3/9/99

DEPTH	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDER COUNT QTY. CLASS	REMARK No.
0	Top 8" topsoil, roots	E		
1'	3' Wide	E	4/A	
2'		E	2/A	
3'	Yellow-bn F-C sand, some to little silt, little to trace clay, trace cobbles (SM) (6-65)	M		
4'		M		
5'		M		
6'	Yellow-bn silty F-M sand, some gravel, rock fragments, possible saprolitic soil (SM/GM) (6-65/5-65)	D	6/A 1/B	Saprolitic
7'	Bottom of excavation 7 feet Sample taken at 7 feet			
8'	Approximate vertical walls			
9'				
10'				
11'				
12'				
13'				
14'				

REMARKS: Groundwater not encountered

TEST PIT PLAN



VOLUME= 5.4 cu.yd.

P:\13032NY\MGTP299.DWG

LEGEND:
BOUNDER COUNT

SIZE RANGE CLASSIFICATION	LETTER DESIGNATION
6"-18"	A
18"-36"	B
36" and Larger	C

PROPORTIONS USED

TRACE (TR.) 0-10%
LITTLE (LI.) 10-20%
SOME (SO) 20-35%
AND 35-50%

ABBREVIATIONS

F-FINE
M-MEDIUM
C-COARSE
F/M-FINE TO MEDIUM
F/C-FINE TO COARSE
V-VERY
GR.-GRAY
BN.-BROWN
YEL-YELLOW

EXCAVATION EFFORT

E EASY
M MODERATE
D DIFFICULT

GROUNDWATER

ELAPSED TIME TO READING (HRS.) G.W.

TEST PIT FIELD LOG

Warren George, Inc. Foot of Jersey Ave. Jersey City, NJ 07303	PROJECT DESCRIPTION Mosholu GC LOCATION Bronx, NY	TEST PIT No. MG-TP3-99 FILE No. MGTP399.DWG DATE 9 Mar. 99

ENGINEER R. Kantor

WEATHER 35° F, Sunny

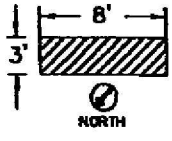
EXCAVATION EQUIPMENT
CONTRACTOR Smith Bros.
OPERATOR John Smith
MAKE Nagano MODEL NS-35
CAPACITY 0.5 cu.yd. REACH 12 ft.

GROUND ELEV. 187.07
TIME STARTED 1215 3/9/99
TIME COMPLETED 1300 3/9/99
N: 320353 E: 621806

DEPTH	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDER COUNT QTY. CLASS	REMARK No.
0	Top 8" topsoil	E	5/A	
1'	3' Wide — 8' — Yellow–bn F–C sand, some to little silt, little to tr. clay & cobbles, moist to wet (SM)	M	1/A	
2'		M		
3'		M		
4'	Yellow–bn silty F–M sand, some gravel, rock fragments, possible saprolitic soil (SM/GM) (6–65/5–65)	M/D	3/A 7/A	
5'	Water at 5' ▽	D	6/A 1/B	Saprolitic
6'	Bottom of excavation 5.5 feet Sample taken at 5.5 feet			Excavation refusal due to bedrock @ 5.5'
7'	Approximate vertical walls			
8'				
9'				
10'				
11'				
12'				
13'				
14'				

REMARKS:
1. Reservoir slab sawcut prior to excavation
2. TP–5 along perimeter wall.

TEST PIT PLAN



VOLUME= 4.89 cu.yd.

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LEGEND:
BOULDER COUNT

SIZE RANGE CLASSIFICATION	LETTER DESIGNATION
6"–18"	A
18"–36"	B
36" and Larger	C

PROPORTIONS USED

TRACE (TR.) 0–10%
LITTLE (LI.) 10–20%
SOME (SO) 20–35%
AND 35–50%

ABBREVIATIONS

F–FINE
M–MEDIUM
C–COARSE
F/M–FINE TO MEDIUM
F/C–FINE TO COARSE
V–VERY
GR.–GRAY
BN.–BROWN
YEL–YELLOW

EXCAVATION EFFOR
E EASY
M MODERATE
D DIFFICULT
GROUNDWATER

ELAPSED TIME TO READING G.W. (HRS.)
No Groundwater

TEST PIT FIELD LOG

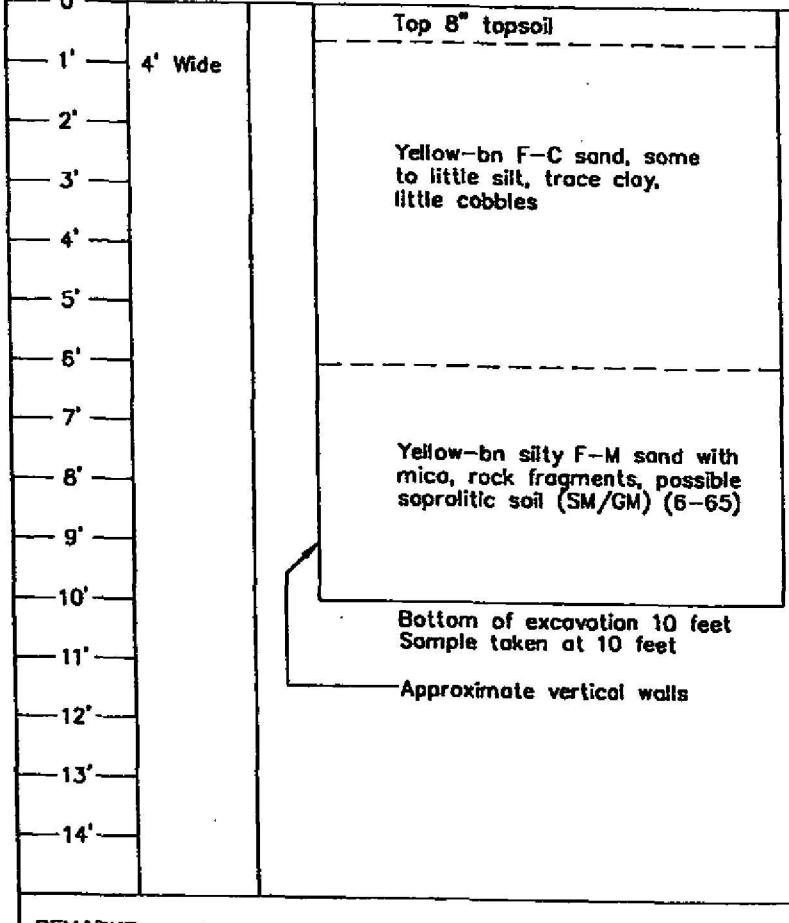
Warren George, Inc. Foot of Jersey Ave. Jersey City, NJ 07303	PROJECT DESCRIPTION Masholu GC LOCATION Bronx, NY	TEST PIT No. MG-TP4-99 FILE No. MGTP499.DWG DATE 9 Mar. 99

ENGINEER R. Kantor

WEATHER 38° F, M. Cloudy

EXCAVATION EQUIPMENT
CONTRACTOR Smith Bros.
OPERATOR John Smith
MAKE Nagano MODEL NS-35
CAPACITY 0.5 cu.yd. REACH 12 ft.

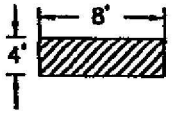
GROUND ELEV. 197.02
TIME STARTED 1350 3/9/99
TIME COMPLETED 1500 3/9/99



EXCAV. EFFORT	BOULDER COUNT QTY. CLASS	REMARK No.
E	4/A	
E	6/A	
M	3/A 2/B	
M	5/A 3/B	
M	6/A 2/B	
M	10/A 4/B	
M	8/A 4/B	Saprolitic
M	11/A 3/B	
D	10/A 3/B	
D	9/A 2/B	

REMARKS: Groundwater not encountered

TEST PIT PLAN



VOLUME= 11.85 cu.yd.

LEGEND:
BOULDER COUNT

SIZE RANGE CLASSIFICATION	LETTER DESIGNATION
6"-18"	A
18"-36"	B
36" and Larger	C

PROPORTIONS USED

TRACE (TR.) 0-10%
LITTLE (LI.) 10-20%
SOME (SO) 20-35%
AND 35-50%

ABBREVIATIONS

F-FINE
M-MEDIUM
C-COARSE
F/M-FINE TO MEDIUM
F/C-FINE TO COARSE
V-VERY
GR.-GRAY
BN.-BROWN
YEL-YELLOW

EXCAVATION EFFORT

E EASY
M MODERATE
D DIFFICULT

GROUNDWATER

ELAPSED TIME TO READING G.W. (HRS.)

P:\1\2003\MGTP499.DWG

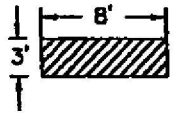
TEST PIT FIELD LOG

Warren George, Inc. Foot of Jersey Ave. Jersey City, NJ 07303	PROJECT DESCRIPTION Mosholu GC LOCATION Bronx, NY	TEST PIT No. MG-TP5-99 FILE No. MGTP599.DWG DATE 10 Mar. 99
ENGINEER Kantor WEATHER 24° F, P. Sunny	EXCAVATION EQUIPMENT CONTRACTOR Smith Bros. OPERATOR John Smith MAKE Nagano MODEL NS-35 CAPACITY 0.5 cu.yd. REACH 12 ft.	GROUND ELEV. 195.39 TIME STARTED 0815 3/10/99 TIME COMPLETED 1000 3/10/99

DEPTH	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDER COUNT QTY. CLASS	REMARK No.
0	Top 12" topsoil	E		1 topsoi
1'	3' Wide	E		
2'		E		
3'	Yellow-bn F-C sand, some to little silt, little to trace cobbles, trace clay, moist (SM) (6-65)	E	3/A 1/B	
4'		M	7/A 2/B	
5'		M	8/A 2/B	Saprolitic
6'	Yellow-bn silty sand, trace gravel, rock fragments, possible saprolitic soil (SM) (6-65)	D	11/A 3/B	Saprolitic
7'	Bottom of excavation 7 feet Sample taken at 7 feet			
8'	Approximate vertical walls			
9'				
10'				
11'				
12'				
13'				
14'				

REMARKS: Groundwater not encountered

TEST PIT PLAN



VOLUME= 6.22cu.yd.

LEGEND:
BOULDER COUNT

SIZE RANGE CLASSIFICATION	LETTER DESIGNATION
6"-18"	A
18"-36"	B
36" and Larger	C

PROPORTIONS USED

TRACE (TR.)	0-10%
LITTLE (LI.)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS

F-FINE
M-MEDIUM
C-COARSE
F/M-FINE TO MEDIUM
F/C-FINE TO COARSE
V-VERY
GR.-GRAY
BN.-BROWN
YEL.-YELLOW

EXCAVATION EFFOR

E EASY
M MODERATE
D DIFFICULT
GROUNDWATER

ELAPSED TIME TO READING G.W. (HRS.)

P:\1-JOBS\MG\MGTP599.DWG

TEST PIT FIELD LOG

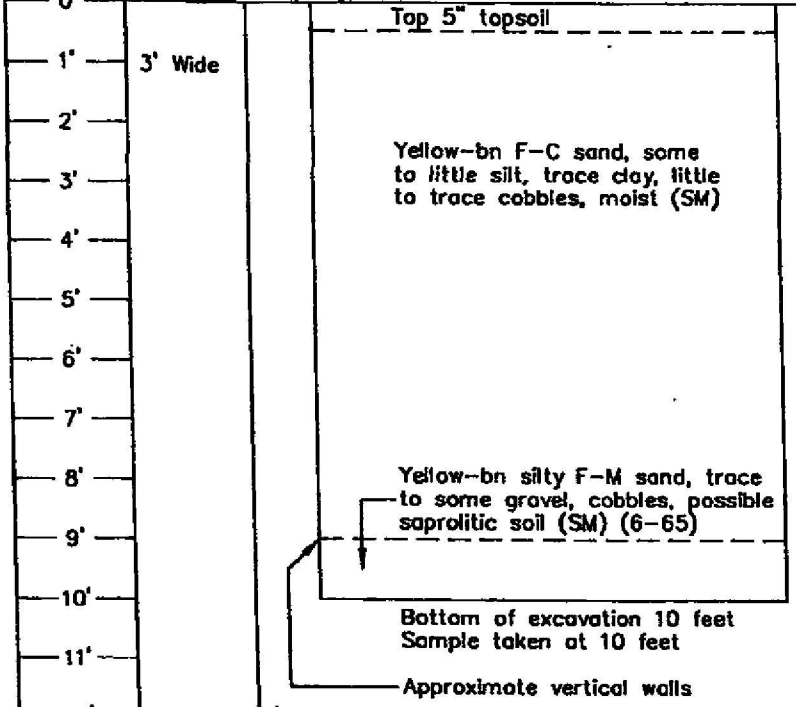
Warren George, Inc. Foot of Jersey Ave. Jersey City, NJ 07303	PROJECT DESCRIPTION Mosholu GC LOCATION Bronx, NY	TEST PIT No. MG-TP6-99 FILE No. MGTP699.DWG DATE 10 Mar. 99

ENGINEER R. Kantor

WEATHER 35° F, P. Sunny

EXCAVATION EQUIPMENT
CONTRACTOR Smith Bros.
OPERATOR John Smith
MAKE Nagano MODEL NS-35
CAPACITY 0.5 cu.yd. REACH 12 ft.

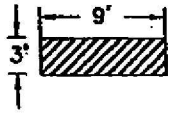
GROUND ELEV. 195.32
TIME STARTED 1015 3/10/99
TIME COMPLETED 1130 3/10/99



EXCAV. EFFORT	BOULDER COUNT QTY. CLASS	REMARK No.
E		
E		
E	7/A 1/B	
E	3/A	
E	4/A	
E	4/A	
E	6/A	
M	8/A 1/B	
M	12/A 1/B	
D	11/A 1/B	Saproliti

REMARKS: Groundwater not encountered

TEST PIT PLAN



VOLUME= 10.00cu.yd.

P:\1303ENV\MGTP699.DWG

LEGEND:

BOULDER COUNT

SIZE RANGE CLASSIFICATION	LETTER DESIGNATION
6"-18"	A
18"-36"	B
36" and Larger	C

PROPORTIONS USED

TRACE (TR.) 0-10%
LITTLE (LI.) 10-20%
SOME (SO) 20-35%
AND 35-50%

ABBREVIATIONS

F-FINE
M-MEDIUM
C-COARSE
F/M-FINE TO MEDIUM
F/C-FINE TO COARSE
V-VERY
GR.-GRAY
BN.-BROWN
YEL-YELLOW

EXCAVATION EFFOR

E EASY
M MODERATE
D DIFFICULT
GROUNDWATER

ELAPSED TIME TO READING G.W. (HRS.)

TEST PIT FIELD LOG

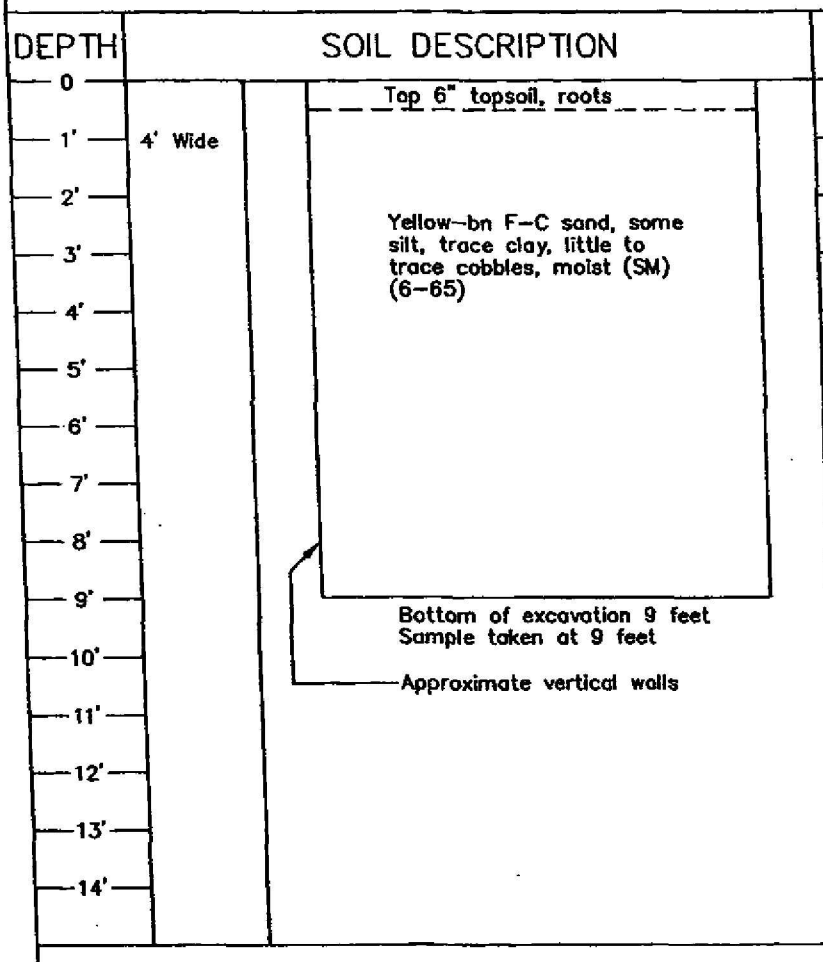
Warren George, Inc. Foot of Jersey Ave. Jersey City, NJ 07303	PROJECT DESCRIPTION Mosholu GC LOCATION Bronx, NY	TEST PIT No. MG-TP7-99 FILE No. MGTP799.DWG DATE 10 Mar. 99

ENGINEER R. Kantor

WEATHER 38° F, M, Sunny

EXCAVATION EQUIPMENT
CONTRACTOR Smith Bros.
OPERATOR John Smith
MAKE Nagano MODEL NS-35
CAPACITY 0.5 cu.yd. REACH 12 ft.

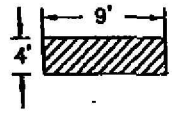
GROUND ELEV. 192.28
TIME STARTED 1310 3/10/99
TIME COMPLETED 1700 3/10/99



EXCAV. EFFORT	BOULDER COUNT QTY. CLASS	REMARK No.
E	2/A 1/C	Lg. boulder just below surface
E	5/A	
E	7/A	
M	11/A 1/B	
M	8/A	
M	7/A	
M	10/A 1/B	
D	12/A 2/B	
D	12/A 3/B	

REMARKS: Groundwater not encountered
Larger quantity of boulders than in previous test pits.

TEST PIT PLAN



VOLUME= 12.00cu.yd.

LEGEND:
BOULDER COUNT

SIZE RANGE CLASSIFICATION	LETTER DESIGNATION
6"-18"	A
18"-36"	B
36" and Larger	C

PROPORTIONS USED

TRACE (TR.)	0-10%
LITTLE (LI.)	10-20%
SOME (SO)	20-35%
AND	35-50%

ABBREVIATIONS
F-FINE
M-MEDIUM
C-COARSE
F/M-FINE TO MEDIUM
F/C-FINE TO COARSE
V-VERY
GR.-GRAY
BN.-BROWN
YEL.-YELLOW

EXCAVATION EFFORT
E EASY
M MODERATE
D DIFFICULT
GROUNDWATER

ELAPSED TIME TO READING G.W. (HRS.)

P:\13532NY\MGTP799.DWG

TEST PIT FIELD LOG

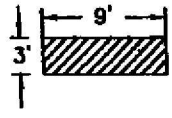
Warren George, Inc. Foot of Jersey Ave. Jersey City, NJ 07303	PROJECT DESCRIPTION Mosholu GC LOCATION Bronx, NY	TEST PIT No. MG-TP10-99 FILE No. MGTP1099.DWG DATE 11 Mar. 99
ENGINEER R. Kantor WEATHER 38° F, Sunny	EXCAVATION EQUIPMENT CONTRACTOR Smith Bros. OPERATOR John Smith MAKE Nagano MODEL NS-35 CAPACITY 0.5 cu.yd. REACH 12 ft.	GROUND ELEV. 168.60 TIME STARTED 1030 3/11/99 TIME COMPLETED 1145 3/11/99

DEPTH	SOIL DESCRIPTION	EXCAV. EFFORT	BOULDER COUNT QTY. CLASS	REMARK No.
0	Top 10" topsoil	E		Topsoil
1'	3' Wide Water seeping at 2' ▽	E	6/A	Fill material
2'	10"–5' Brown F–C sand, some to little silt, little to trace cobbles, trace clay, ash, brick fragments, moist to wet (fill)	E	5/A	
3'		E	7/A 1/B	
4'		E	6/A	Gray organic silt dense
5'	5'–7.5' Gray–bn mottled F–C sand, little to trace silt, trace cobbles, trace clay, micaceous, moist to wet (SM) (7–65)	D	5/A 1/B	
6'		D	6/A 1/B 1/C	
7'				
8'	Bottom of excavation 7.5 feet Sample taken at 7.5 feet			
9'	Approximate vertical walls Unstable walls at 2–5 feet			
10'				
11'				
12'				
13'				
14'				

REMARKS:

P:\1303\MGTP1099.DWG

TEST PIT PLAN



VOLUME= 8.33 cu.yd.

LEGEND:
BOULDER COUNT

SIZE RANGE CLASSIFICATION	LETTER DESIGNATION
6"–18"	A
18"–36"	B
36" and Larger	C

PROPORTIONS USED

TRACE (TR.) 0–10%
UTTLE (U.) 10–20%
SOME (SO) 20–35%
AND 35–50%

ABBREVIATIONS

F–FINE
M–MEDIUM
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F/M–FINE TO MEDIUM
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GR.–GRAY
BN.–BROWN
YEL–YELLOW

EXCAVATION EFFORT

E EASY
M MODERATE
D DIFFICULT
GROUNDWATER

ELAPSED TIME TO READING G.W. (HRS.)