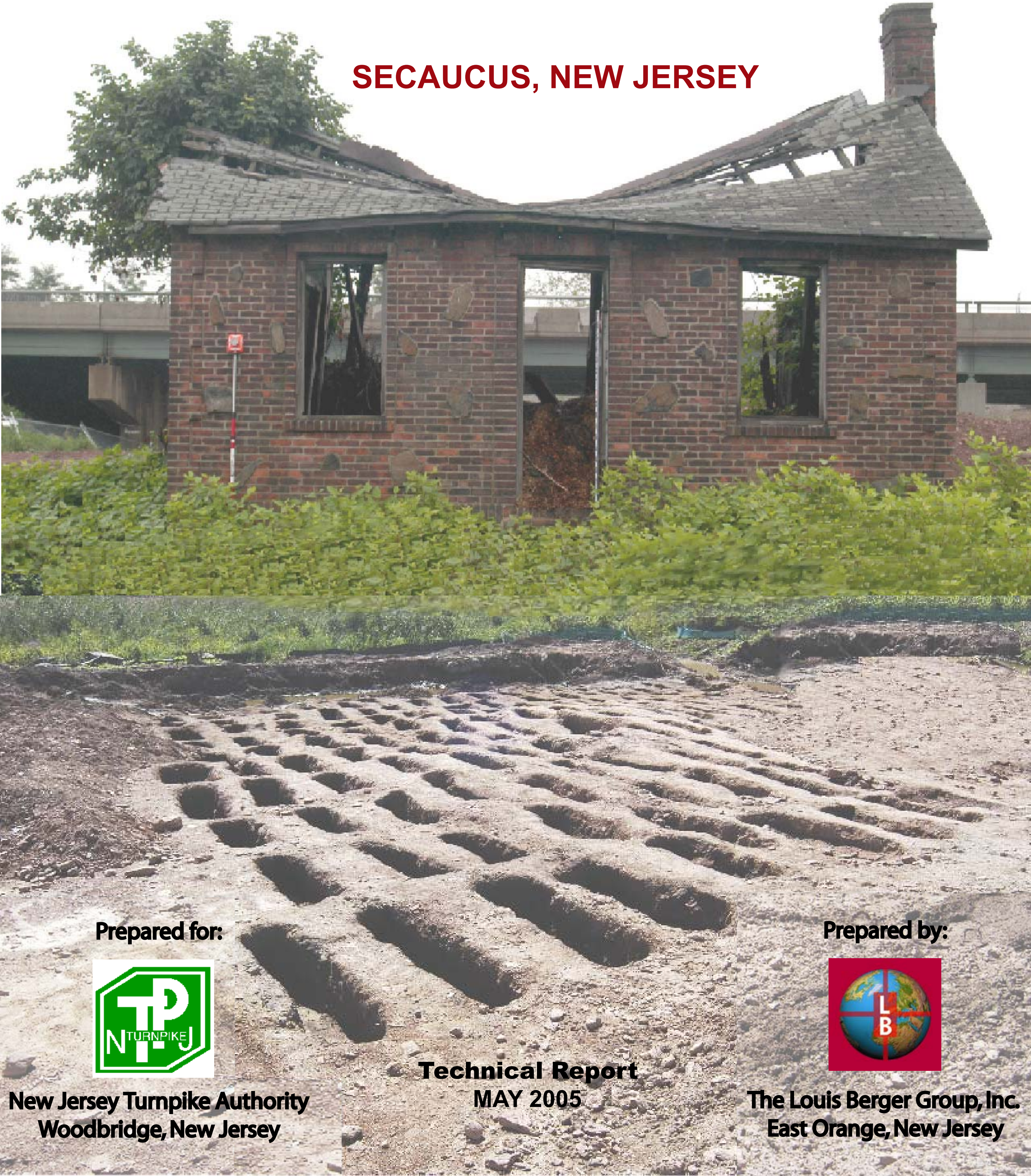
POTTER'S FIELD DISINTERMENT / REINTERMENT

SECAUCUS INTERCHANGE PROJECT

SECAUCUS, NEW JERSEY



Prepared for:

New Jersey Turnpike Authority
Woodbridge, New Jersey

Technical Report
MAY 2005

Prepared by:

The Louis Berger Group, Inc.
East Orange, New Jersey

EXECUTIVE SUMMARY

The Cultural Resource Division of The Louis Berger Group, Inc. (Berger), was awarded a contract with the New Jersey Turnpike Authority (Turnpike Authority) to perform disinterment and reinterment activities at the Potter's Field burial ground in Secaucus, Hudson County, New Jersey. Potter's Field is located in Section 1 of the Secaucus Interchange Project, near the northwestern corner of the overall construction project. The new interchange is expected to open in the fall of 2005.

The Potter's Field is one of three burial grounds documented in Secaucus near Laurel Hill, but it was the only one to be impacted by the Secaucus Interchange Project. These three burial grounds were used to bury deceased from Hudson County's former institutional complex at Snake Hill (now called Laurel Hill) and others from nearby cities within the county. The Secaucus Interchange Project was expected to impact about 3 acres, some of which was suspected to include Potter's Field. Therefore, Berger was engaged to locate graves, disinter human remains, perform basic osteological analyses of a sample of the disinterred individuals, and reinter the individuals in an existing, formal cemetery.

According to historical documents, the Snake Hill region of Secaucus was occupied by the Old Bergen County Poor Farm in the late 1700s. In 1845 Old Bergen County split into Passaic and Bergen counties, and Hudson County purchased the poor farm to locate a variety of county facilities. In 1855 Hudson County began building several institutions here, and between 1855 and 1962, the facility included insane asylums, jails, almshouses, orphanages, hospitals, the county agricultural farm and piggery, and three cemeteries. The Hudson County Burial Grounds at Snake Hill, including Potter's Field, were established in 1880. In 1962 burial operations ceased at this location. When the eastern spur of the Turnpike was built in 1950, a two-span bridge was built to pass over Potter's Field, and in the 1980s Hudson County built a temporary detention center over a portion of Potter's Field. By that time the location of Potter's Field was unknown by Hudson County.

The first substantive attempts to re-establish the location of Potter's Field occurred 12 years later when, in 1992, the Turnpike was beginning assessments for the Secaucus Interchange Project. In 1996 additional archaeological investigations, including the use of remote sensing techniques and the excavation of trenches, determined that human remains were in fact buried within the cemetery and were in fairly good condition, though no grave markers were found. Historic landfill covered the burial grounds to depths exceeding 6 feet (3 meters) in places. In 1996 the New Jersey Historic Preservation Office (NJHPO) determined that Potter's Field was not eligible for listing in the National Register of Historic Places because of lack of depositional integrity.

Identifying the locations of unmarked graves in a burial ground covered by nearly 6 feet of landfill was difficult. During the initial studies for the Secaucus Interchange Project, Hudson County officials discovered the official Burial Registers and several maps showing the layout of portions of Potter's Field. The historic maps depicted 12 sections with monuments set at the corners of each section. Based on the maps, Turnpike consultants estimated that approximately 1,200 graves containing approximately 3,500 individuals were located within the proposed Secaucus Interchange Project area and that use of Potter's Field began in 1923. The Burial Registers, however, list 9,781 individuals interred between December 31, 1880, and April 12, 1962.

Berger's Secaucus Potter's Field excavations began in February 2003. Although no individual grave markers were found in place, a few were encountered within the imported fill above the burials. Berger discovered the original monuments marking the section corners, which facilitated matching the historic maps to the ground. Archaeological investigations involved careful use of heavy machinery, remote sensing, and careful hand excavation of individual grave shafts. On October 31, 2003, the last individual was disinterred from Potter's Field. After almost nine months of intensive field efforts (approximately 186 field days), the Berger team of over 100 archaeologists, osteologists, and field technicians exhumed the remains of 4,571 individuals. As part of the disinterment activities, more than 79,000 cubic yards of soil were excavated, moved, and graded to expose 2,693 graves over an area of about 4.1 acres, including the a 2.3-acre area of Potter's Field.

A total of 113,579 artifacts or non-skeletal objects were recovered, of which over 50 percent were coffin nails. Other personal effects or "grave goods" included dentures, glass eyes, coins, clay smoking pipes, embalming bottles, whiskey/wine bottles, combs, over 4,500 buttons, over 500 ceramic fragments, clothing remnants, shoes, hats, jewelry, military medals, religious items, and medical devices or prosthetics.

Osteological analyses at Potter's Field revealed evidence that the causes of death of the interred individuals included infectious diseases, such as smallpox, tuberculosis, cholera, and influenza; pathologies, including lesions, vertebral fusion, untreated fractures, and developmental defects; and trauma. There was also evidence of a number of autopsies and amputations.

Using historical maps, original hand-written burial ledgers, osteological examination, background research, and artifact analysis, the Berger team was able to determine identities of 825 individuals. Of particular note, positive identifications were established for two individuals who have living linear descendants. The remains of a woman who died in 1928 and a man who was buried in 1949 were returned to their respective families for private ceremonies and reburial

The remaining 4,569 individuals exhumed from Potter's Field together with their personal effects were reinterred by Berger's archaeologists in Section K of the Maple Grove Park Cemetery located in the town of Hackensack, Bergen County, New Jersey. The remains were placed in 94, standard, triple-depth precast concrete burial vaults along with the remains and objects recovered from Potter's Field. In the fall of 2004 a granite memorial monument with bronze plaques listing over 7,000 named individuals from the burial ledgers was erected at Maple Grove Park Cemetery followed by a dedication service. This monument will stand as a permanent reminder for all those poor, unhealthy, or nameless individuals who were buried in the Hudson County Burial Grounds. This site will serve in perpetuity as their final resting place and a sanctuary of peace.

ACKNOWLEDGMENTS

The Potter's Field disinterment/reinterment project involved hundreds of individuals, some of whom invested thousands hours and others who provided support and guidance behind the scenes. For each and every one of these individuals, the Potter's Field project is a milestone characterized by special events and memories. The Louis Berger Group, Inc. (Berger), is indebted to all those who provided words of encouragement, guidance, and services.

Without the forethought and steadfast commitment of the New Jersey Turnpike Authority, 4,571 individuals, some of who were the first generation immigrants to this country would have remained forgotten and unclaimed. It is with great pride that members of Louis Berger's Potter's Field team acknowledge the efforts of the New Jersey Turnpike Authority. The support, dedication, and respect exhibited by every member of the Turnpike — from the Executive Director to the chief administrators, principle and supervising engineers, and various department staff members — was exemplary. Throughout Berger's fieldwork, members of the Turnpike Authority remained vigilant and interested in the evolving hypotheses and interpretations, daily discoveries, methodological approaches, and sanctity of the overall project.

Berger would formally like to acknowledge and thank Mr. Michael Lapolla, Executive Director of the Turnpike Authority for his resolve to pursue decisions that affected thousands of individuals. Mr. Lapolla was faced with the responsibility of committing to a plan that balanced the sanctity and dignity of thousands of New Jersey's early immigrants while simultaneously providing for the needs of hundreds of thousands of New Jersey's motorists.

Sincere appreciation is also extended to Robert Grimm, Assistant Chief Engineer-Turnpike Division, and Larry Williams, Supervising Engineer-Highways, for making this unique project a reality. Their expertise and guidance in the numerous contractual, financial, and legal aspects of this complex multidisciplinary project are commended. The Berger team also wishes to extend its gratitude to both gentlemen for their trust and support throughout the duration of the Potter's Field disinterment/reinterment project.

John M. Keller, Assistant Supervising Engineer-Highways and Project Manager for the Secaucus Interchange Project (SIP), deserves special recognition for his professionalism, flexibility, encouragement, and compassion. As the Turnpike's Project Manager and client point of contact, Mr. Keller was responsible for overseeing and assessing Berger's work and performance while orchestrating other aspects of this major design and construction project. Although these are typical functions of a project manager it must be duly noted that Mr. Keller had no manuals, handbooks, or spreadsheets to guide him. He was, after all, managing the largest disinterment/reinterment project ever attempted under one contract in the United States. Moreover, Mr. Keller, a well-educated and experienced engineer, was faced with a completely new almost foreign language — archaeology and osteology. In order to truly appreciate and understand daily activities, discoveries, methodologies, and progress, John was thrust into a crash course that he ultimately passed with flying colors. Aside from his grasp of the scientific terminology, he jumped in and got his hands dirty which led to a better appreciation of the meticulous effort required over the 186-day field effort. His most important contribution to the overall success of the project was his patience and resilience in overcoming the numerous and unforeseen obstacles.

Our thanks are also extended to Chief Richard Raczynski, Chief Engineer for the Turnpike Authority, for his cooperation, support, and interest in the project, and Ricardo McNeil, Project Engineer. The Berger team also recognizes Joe Orlando, spokeperson for the Turnpike Authority, for his efforts in keeping the persistent media up to date on the status and special events of the project. Last but not least, Lynn

Tanelian deserves recognition for her diligence in maintaining open avenues of communications between the Turnpike's and Berger's Project Managers.

The Berger team also acknowledges the contributions of the law firm of Wilentz, Goldman & Spitzer, legal counsel for the Turnpike Authority. In particular, Francis X. Journick, Jr. Esq. for his legal expertise, courtroom demeanor, attention to detail, and camaraderie throughout the duration of this project. Our thanks also are extended to Ivette Alvarado-Gomez and Cynthia DeSousa for their assistance in the preparation of certifications and legal briefs.

The Honorable Thomas P. Olivieri, J.S.C., who presided over the case in the Brennan Courthouse in Jersey City, also deserves special recognition. Judge Olivieri carefully listened to testimony and conducted several site visits in an effort to obtain critical information necessary to issue final rulings in this precedent setting legal case. The Berger team also acknowledges the efforts of John Hugelmeyer, Deputy Attorney General representing the defendants in the case and the representatives of the New Jersey Cemetery Board for their diligence and cooperation.

The Berger team also wishes to extend its sincere gratitude to the Andriani family, and the family of Alfonsina Pansini, particularly Ms. Diane Brule, for their cooperation and trust. Both families provided information critical to Berger's research team in an effort to locate their lost relatives. The Berger team takes great pride in knowing that these families have embraced their dearly departed and provided them with the proper reburial and recognition they so long deserved.

Berger also appreciates the expertise of the numerous and varied subconsultants who provided services throughout the duration of this project. Our thanks are extended to Ted Freas and the members of Greentree Contracting provided and supervised all general contracting tasks; Mr. Jeffrey Macanka and Introcaso-Angelo Funeral Home in Jersey City; Michael DiPiazza and staff of Koch Monument Company in Hackensack; Dorothy Ricther and staff of Hager-Richter Geoscience, Inc. for expertise in the field of geophysical survey; the Armond Corporation; McHolland Security; Barbara Kirby, President of Maple Grove Park Cemetery and staff; Creter Vault Company of Fleming working on behalf of the Turnpike Authority to prepare, deliver, and install pre-cast concrete burial vaults to the reinterment cemetery; and Kevin Barry, Facility Manager for the Hudson County Department of Public Resources in Secaucus.

The Berger team would also like to extend its appreciation to the local clergy for their prayers and blessings at the various services conducted during this project. The local community also deserves recognition for their hospitality to more than 100 archaeologists who gathered daily (nightly) to relax and obtain sustenance in order to carry out their nine month tedious and exhausting ordeal.

A team is built on dedicated and experienced staff and so special recognition is extended to Berger's staff of archaeological supervisors and technicians who without discussion or direction cared and treated for each set of human remains as if they were their own mother, father, sister, brother or friend. The personal commitment, sympathy for the deceased, convictions to correct the tragedy of being forgotten in death drove these individuals through cold, snowy, wet, windy, hot, humid, and long exhausting days.

Susan D. Grzybowski
Berger Project Manager

Roderick S. Brown
Principal Archaeologist

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

CHAPTER PAGE

TABLE OF CONTENTS (continued)

APPENDICES

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF TABLES

LIST OF CHARTS

LIST OF PLATES

LIST OF PLATES (continued)

LIST OF PLATES (continued)

LIST OF PLATES (continued)

LIST OF PLATES (continued)

LIST OF PLATES (continued)

LIST OF PLATES (continued)

CHAPTER 1. INTRODUCTION

A. PROJECT PURPOSE

The New Jersey Turnpike Authority (Turnpike Authority) plans to construct a new interchange, the Secaucus Interchange, between Interchanges 15E and 16E/18E on the Eastern Spur of the New Jersey Turnpike, as well as other related roadway improvements in Hudson County, New Jersey (Figure 1-1). The Secaucus Interchange Project (SIP), as it is known, will provide travelers with direct access to the recently constructed New Jersey Transit (NJTransit) rail station, known as Secaucus Rail Station, as well as the Secaucus Warehouse District and the planned commercial development to be constructed by private interests, generally referred to as "Allied Junction," to be located adjacent to the Secaucus Rail Station.

The SIP is the latest effort by the Turnpike Authority to integrate transportation solutions with economic development. The project ties together a major multi-modal rail station and a significant freight rail yard owned and operated by Norfolk Southern Corporation, and provides traffic benefits for a key region in the New Jersey-New York metropolitan area. These transportation projects in turn promote jobs, construction, sustained commerce, and the renaissance of Hudson County.

Scheduled for completion in the fall of 2005, the SIP consists of a network of six at-grade and elevated ramps providing movement to and from the Turnpike's Eastern Spur through a new nine lane toll plaza (Figure 1-2). The overall project extends from New County Road at its northernmost extent under the Turnpike's Eastern Spur and then along a 1-mile long southerly trending corridor located just west of and parallel to NJTransit's Bergen County Line/Main Line. Near the Public Service Electric & Gas (PSE&G) Hudson County Generating facility, the ramped roadway network loops back in a northerly direction to connect with another of the Turnpike Authority's projects, Seaview Drive Extension. Roadway improvements and re-use of a former Bergen Line railroad track bed associated with the Seaview Drive Extension Project will enhance the circulation of traffic to the Secaucus Warehouse District. The new Secaucus Interchange is expected to cost about $235 million and carry about 40,000 vehicles a day when completed.

The SIP's northernmost portion, located between New County Road and Amtrak's Northeast Corridor Line and Secaucus Rail Station, designated Section No. 1 of the design and construction contracts, contained an old, unmarked burial ground. The "Former Burial Ground" or "Potter's Field" is one of the three documented burial grounds once associated with Hudson County's former institutional complex at Laurel Hill, also known as Snake Hill. As Potter's Field was located within the area where the Turnpike Authority intended to construct portions of the SIP, the Turnpike Authority proposed to disinter all human remains and reinter those remains in an existing, formal cemetery, thus enabling construction of the SIP to proceed.

In anticipation of the relocation of human remains from Potter's Field, the Turnpike Authority executed an Order for Professional Services (OPS) with The Louis Berger Group, Inc. (Berger), of East Orange, New Jersey. The professional services to be rendered included the total performance of the Potter's Field disinterment and reinterment activities in Section No. 1 of the Secaucus Interchange Project, located in the Town of Secaucus, Hudson County, New Jersey.

FIGURE 1-1: Location of Project Are

SOURCE: Topozone 2005; USGS aerial photo 1997

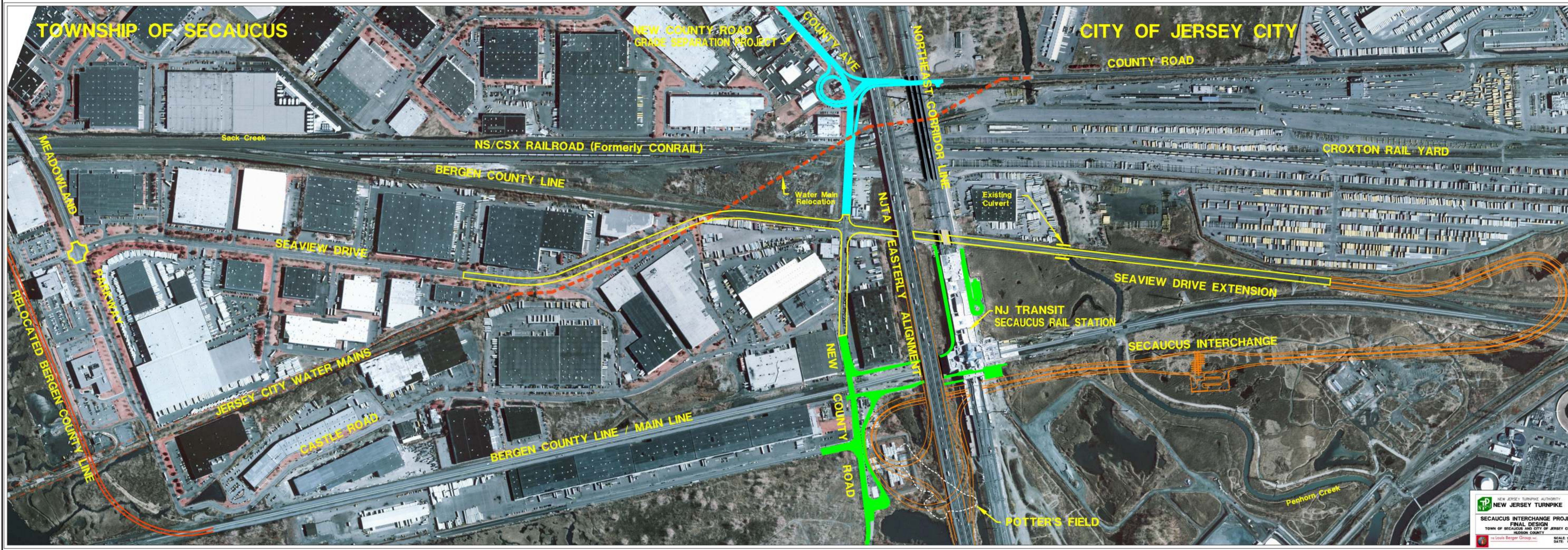


FIGURE 1-2: Detailed Map of Project Area and Vicinity in Relation to Proposed Constructio

SOURCE: The Louis Berger Group, Inc. 2002

B. GOALS AND OBJECTIVES

The primary goal of Berger's work was to locate and disinter all human remains situated within the project area where the SIP would be constructed and to relocate all human remains to an existing and functioning cemetery within Hudson County. From an administrative, scientific, legal, and humanistic perspective, the Potter's Field disinterment and reinterment project sets a precedent. Owing to the sensitive nature of the overall project, the disinterment and reinterment of individuals from Potter's Field presented a myriad of considerations, stipulations, mandates, and regulations that required scrupulous and well thought out approaches in order to achieve a balance between maintaining the sanctity of the deceased while successfully completing the professional scope of services. In addition, the sheer quantity of expected remains in this once hallowed ground challenged the technical team with a series of unique situations and circumstances beyond the scope of those normally associated with archaeological excavations, surveying, mapping, analysis, recordation, and data management. While the multidisciplinary team of experts had to locate unmarked graves and recount events that had taken place at the burial ground, they were also tasked with the responsibility of reclaiming the identity of thousands of individuals who had found Potter's Field to be their final resting place on earth. Moreover, the project necessitated the assembly and cooperation of a distinctive group of participants, including engineers, agency administrators, archaeologists, osteologists, and a mortician, to design and implement the scope of work; and lawyers and judges responsible for the lawful resolution of issues associated with the project. In addition, familial descendants, members of the general public, and the media constantly voiced concern and interest throughout the duration of the project.

This narrative report serves as both the administrative documentation of the overall disinterment/reinterment program and the technical report of findings. The following chapters detail the project approach, background, documentary research, field and analytical procedures, results, and interpretations of the Potter's Field disinterment and reinterment project. As appropriate, selected project photographs, cartographic images, field maps, and other relevant imagery have been inserted to assist in the discussions of the various elements and tasks associated with the project. Chapter 2 of this volume presents an overview of the project, focusing on the history of the project, legal and regulatory compliance, and the approved scope of work. Chapter 3 discusses the environmental characteristics of the project area and vicinity. The historical context and history of Potter's Field are presented in Chapter 4. Chapter 5 summarizes the general managerial, organizational, and logistical aspects associated with this unique project, and Chapter 6 presents an overview of the standards, methods, and innovative procedures implemented throughout the project. A detailed discussion of the archaeological excavations and exhumations at Potter's Field are presented in Chapter 7. Chapters 8 and 9, respectively, identify and describe the methods and results of the artifact and osteological analysis of the Potter's Field collection. Chapter 10 presents an overview of the reinterment phase of the project. Chapter 11 includes the synthesis and interpretive summary of the historical, cartographic, archaeological, artifactual, and osteological evidence recovered from Potter's Field. Of particular interest in this chapter are the detailed descriptions of selected graves, indicating how archaeological evidence, archival research, artifact analysis, and osteological examination collectively worked to reclaim the identity of unmarked or unknown individuals within the burial ground.

Supporting documentation has been placed in the report appendices that constitute volumes separate from the narrative technical report. The appendices include a complete set of burial inventory forms for each burial exhumed from Potter's Field, the inventory of all artifacts or non-skeletal objects recovered from Potter's Field, the ground penetrating radar (GPR) study report, the New Jersey State Museum archaeological site registration form for Potter's Field, inventory of documents maintained by the Hudson County administrative offices, a list of all named individuals transcribed from the Hudson County Burial

Registers, a complete list of identified disinterred individuals, the Final Court Order and modifications, the results of the Meadowview Campus cemetery survey, and a listing of newspaper and media coverage associated with the project.

CHAPTER 2. PROJECT OVERVIEW

A. CHRONOLOGICAL HISTORY OF PROJECT

The New Jersey Turnpike Authority's earliest considerations for the deceased interred at Potter's Field in Secaucus near Laurel Hill (or Snake Hill) occurred in the early 1950s, when the newly created "Turnpike Authority" was preparing engineering studies for the construction of the final 9 miles of the original Turnpike, extending from Newark to Ridgefield Park. During the planning stages for the new highway, it was determined that an active "Burial Ground" was partially located within the right-of-way, between Survey Stations 645+00 and 647+00, just east of Laurel Hill. In order to accommodate the new highway, this section of the Turnpike was redesigned to include construction of a bridge to minimize the impact to graves in the burial ground. In this manner, the majority of graves would be "bridged" or "jumped over" while the remainder of the Turnpike would be constructed on a fill embankment. Since construction of a proposed 190-foot-long bridge called for construction of three piers with footings and bridge abutments, it was decided that any graves located in the areas of the southern and central pier footings would be removed and reburied in a 20x50-foot plot roughly 140 feet north-northeast of the then limits of the active burial ground (see Chapter 4).

In 1992, the Turnpike Authority began its preliminary planning and environmental studies for the proposed SIP. As part of these preliminary studies, the first substantive attempts to identify and quantify persons buried in Potter's Field occurred during a Stage 1A archaeological investigation conducted in July 1992 by Joan Geismar, Ph.D. Although Dr. Geismar developed sufficient information to support a recommendation that a Stage 1B investigation should be conducted as a follow-up, lists of the persons buried in Potter's Field were not found during her research despite inquiries to officials of the County of Hudson. According to notations discovered on an undated planning map for the New Jersey Turnpike, "there were 891 bodies in twelve sections, but maps in the Hudson County Engineers office indicate that there were 927 known burials in these twelve sections prior to 1941" (Geismar 1992:40). It was further noted that, "the number of burials after this date, or the number that may have occurred before records were kept, is unknown" (Geismar 1992:40).

In 1996, a Stage 1B archaeological investigation was carried out by Greenhouse Consultants to determine if human remains were still interred at Potter's Field. This investigation used GPR to review selected areas of Potter's Field. Results of the GPR study confirmed a high degree of disturbance, and additional studies were subsequently conducted utilizing a small backhoe to excavate test pits in areas identified by GPR followed by the manual excavations, photo-documentation, and cataloging of recovered materials. Results of the investigation indicated that human remains together with remnants of wooden coffins, such as wood and nails, were present. These field investigations provided evidence that showed not only that graves had been dug in the area, but also that human remains were still present below the ground surface ranging from 1.4 feet to 4.85 feet below the surface.

In accordance with the National Historic Preservation Act (NHPA), 36 CFR Part 800: Protection of Historic Properties, the New Jersey State Historic Preservation Office (NJHPO) issued a formal opinion in a June 16, 1996, letter to the U.S. Army Corps of Engineers (USACOE) that Potter's Field was not eligible for listing in the New Jersey Register of Historic Places (NJRHP) or National Register of Historic Places (NRHP) because it lacked depositional integrity. The determination letter indicates that the burial ground was no longer in use, there did not appear to be any visitors to the burial ground, and no grave markers were visible. Therefore, the Section 106 review process (see Chapter 2.C.3) for the project resulted in a finding of "no historic properties adversely affected."

In April 2002, the County of Hudson discovered a three-volume set of ledgers documenting a Register of Burials, as well as several maps showing the layout of some burial ground sections and some grave plots presumably associated with Potter's Field. These materials indicated that approximately 1,200 grave shafts might be located within Potter's Field and would be impacted by the SIP. The exact number of burials that might be present in these grave shafts was difficult to determine accurately, as multiple interments were documented to have occurred for many of the plots and several disinterments were also identified in the burial ledgers. These materials collectively suggested that Potter's Field may have been used from as early as approximately 1920 to April 12, 1962, the last entry in the burial ledgers, and that the other burials listed in the Register of Burials may have been placed in the other two burial grounds formerly used by Hudson County.

Subsequent to finding the additional records in April 2002, the Turnpike Authority re-opened discussions with the NJHPO in August 2002 and provided the NJHPO with copies of the recently discovered maps and records. Based upon a review of the additional records and provided that the recommendations offered by the NJHPO would be considered in the Turnpike's disinterment approach, the NJHPO indicated that their earlier conclusion concerning the ineligibility of Potter's Field to meet the criteria for inclusion in the New Jersey and National Registers of Historic Places remained unchanged.

On September 26, 2002, the Turnpike Authority issued a Request For Proposals to pre-qualified consulting firms with archaeological experience with the specific intent of engaging an archaeological firm to undertake all disinterment and reinterment activities associated with the Secaucus Potter's Field Project. At the Turnpike Authority's October 2002 Commission Meeting, The Louis Berger Group, Inc., was issued the Order for Professional Services (OPS) and immediately initiated negotiations and contractual relations with the Turnpike Authority.

B. SCOPE OF WORK

As originally proposed by the Turnpike Authority, the *mandatory* tasks associated with the scope of work included the following:

- Supervision of all work by a qualified archaeologist.
- Locate and exhume all human remains from Potter's Field in a dignified and professional manner.
- Emplace all recovered remains into new containers.
- Provide for the staging and/or temporary on-site storage of new burial containers.
- Transport all exhumed remains to the selected reinterment cemetery.
- Design and install a monument at the selected reinterment cemetery that memorializes the reburied human remains from Potter's Field.
- Employ an osteologist and a New Jersey licensed mortician who is required by New Jersey to provide oversight of the disinterment and reinterment.

Moreover, as a result of discussions between the Turnpike Authority and the NJHPO, several approaches were also *recommended* for inclusion in the scope of work for the Potter's Field project, including:

- Use of Geographic Information System (GIS) to create a map depicting the basic burial data.
- Preparation by an archaeologist of a systematic plan for the disinterment so as to acquire and record archaeological information via a photographic record and other limited observations (e.g., GPS positioning, human-biologic observations, etc.) documented during the disinterments.
- Utilization of an osteologist to conduct observational monitoring followed by analysis of data from observations in conjunction with data from burial records.

- If possible, identification of individual graves to be accomplished as part of the systematic disinterment — if not possible, then the use of sampling to be considered, with examination of up to five percent of the total number of remains recovered in Potter's Field
- Preparation of a final report for submittal to NJHPO that appropriately documents the disinterment and reinterment program and provides archaeological interpretations and conclusions.

Finally, as a result of a public notice published by the Turnpike Authority intended to notify any living linear descendants of any person or persons buried in Potter's Field, a descendant of an individual believed to be buried in Potter's Field was identified. According to available information and the Register of Burials ledgers, Leonardo Andriani was buried in Potter's Field on December 31, 1948, in Plot 6408. Since the family had long searched to find their relative with no success, and knowing that he had once been laid to rest in Potter's Field, the Turnpike Authority agreed to coordinate and assist the family in their quest to reclaim the remains of their relative, if possible. As such, the scope of work was *amended* to include reasonable efforts to identify Leonardo Andriani who was laid to rest in the lower portion of burial Plot 6408.

In order to satisfy the mandatory scope of work, ensure ultimate acceptance and approval of the disinterment and reinterment by the Chancery Division of the Superior Court of New Jersey, and take into account recommendations offered by the NJHPO, the Turnpike Authority, its lawyers, and consulting firm assisted Berger in the preparation of a detailed Disinterment/Reinterment Plan (Berger 2002). The detailed Disinterment/Reinterment Plan included discussions about site preparatory work, such as establishing fencing to maintain site security, preparation and adherence to a site-specific health and safety plan in accordance with federal regulations, and preparation and certification of a soil erosion and sediment control plan in accordance with state regulations. The Disinterment/Reinterment Plan also presented the rationale for the systematic progression of work from south to north within the burial ground, procedures for the mechanical stripping of overburden and vegetation removal, protection of grave shafts and human remains during the disinterment program, documentation and recordation procedures, standardized exhumation protocols, creation of a temporary on-site storage facility, logistical considerations for the reinterment program, and commitment to prepare a final project report suitable for submission to the NJHPO and State Archives in Trenton.

Since the primary goal of the project was to disinter and reinter all remains from Potter's Field and to treat the human remains with an appropriate level of respect, archaeological research questions were of secondary importance. However, Berger recognized early in the planning stages that if a standardized level of documentation was to be completed for each interment, then some important archaeological information that might otherwise be lost could be collected. Several rudimentary research questions were therefore posed and, as appropriate, incorporated into the standardized documentation form and survey procedures developed specifically for the Potter's Field project. The basic research questions included:

- To what extent are traditional burial practices (east-west alignment of bodies with heads to the west) expressed in the burial ground?
- What styles and construction techniques are embodied in any burial containers (coffins) and did these change over time?
- What changes are evident in the configuration and use of Potter's Field over time?
- What, if any, grave goods (personal belongings) are associated with the interments?
- How does preservation vary within the site? What are the influencing factors?

Owing largely to the limited and sometimes sketchy pieces of information available at the onset of the project, Berger's archaeological team surmised that unforeseen challenges would occur as the project progressed, as later sections of this report attest, no one ever could have expected all that was unveiled from this least known of burial grounds. As fieldwork and exhumation progressed, Berger was faced with the need to expand its mandatory scope of work to include *additional* or *elective* tasks that were critical to understanding the chronology, configuration, and use of Potter's Field over time. Recognizing the importance of these additional tasks, the Turnpike Authority encouraged Berger's archaeological team to proceed with:

- Archival searches for maps, institutional records, and death certificates that would facilitate the location of graves within the burial ground, identification of individuals within the grave shafts, interpretations of temporal affiliations, and population aspects for the burial ground.
- Inventory and analysis of *all* (rather than the mandatory 5 percent) recovered artifacts or non-skeletal objects in order to establish a permanent record and assist in the identification of individuals in unmarked graves.
- Photographic documentation of *all* grave shafts and burials.
- Osteological analysis of disinterred remains to assist in the identification of remains, corroborate field observations, and examine pathologies, diseases, and other skeletal deformities and abnormalities of one or more past generations.
- Additional stripping and trenching to identify and confirm the original topographic setting of Potter's Field and make a better assessment of landscape evolution in the project area.

C. ADMINISTRATIVE AND LEGAL CONSIDERATIONS

1. Ownership and Responsibility

In preparation for construction of the SIP, the Turnpike Authority purchased right-of-way and obtained easement rights to 10.145 acres of property from Hudson County. Included in this land transfer was the property containing Potter's Field, its surviving cemetery office, and the former detention center once operated by the State of New Jersey and federal government. Potter's Field occupied a portion of Block 5, Lot 2; the remaining 94.0 acres of Block 5, Lot 2 are currently owned by Hudson County and outside the limits of this investigation. Therefore, the Turnpike Authority is the lawful owner and user of the property that contained Potter's Field and, as such, has certain rights and responsibilities.

2. Project Funding

Since 1948, the Turnpike Authority has operated as a financially independent state agency in New Jersey. State tax dollars are not used to fund the operation or construction of the Turnpike. Therefore, all funding for the Potter's Field project was the sole responsibility of the Turnpike Authority with no municipal, county, state, or federal financial assistance.

3. Regulatory Compliance - Determination of Eligibility

As part of the overall SIP, the Turnpike Authority was required to apply for and obtain a Section 404 Permit from the USACOE. Section 404 of the Clean Water Act requires approval prior to discharging dredged or fill material into the waters of the United States and is commonly associated with site development near navigable waterways and wetlands. As a federal agency, the USACOE has a statutory obligation to fulfill other federal regulations, including, but not limited to, the requirements of Section 106 of the NHPA, as part of its issuance of permits. The Section 106 process as promulgated in 36 CFR Part 800 (Protection of Historic Properties) includes measures to identify historic properties potentially affected by projects, assess effects, and, if necessary, seek measures to avoid, minimize, or mitigate adverse effects on historic properties. The State Historic Preservation Officer (SHPO) advises and assists federal agencies in carrying out their Section 106 responsibilities. As defined in 36 CFR 800.16, "Historic Property" means "any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places…The term includes artifacts, records, and remains that are related to and located within the properties.…"

During preliminary planning for the SIP, archaeological and historical investigations were completed for review and approval of the NJHPO. Pursuant to Section 106, the NJHPO reviewed the available information presented in the original investigation reports and determined in 1996 that Potter's Field was not eligible for inclusion in the National Register of Historic Places. Although the finding of "no historic property adversely affected" concluded the Section 106 process and required no further action on the part of the NJHPO, the Turnpike Authority continued consultation with NJHPO in 2002 when additional information became available and as part of the Section 404 permit modification in 2003. Moreover, throughout the duration of the disinterment program, the Turnpike Authority maintained open communications with the NJHPO and arranged for a site visit and tour of the project area.

4. New Jersey Cemetery Act

Laws governing cemeteries in New Jersey are compiled under the New Jersey Cemetery Act (Act), Title 8A (Cemeteries) of the New Jersey Statutes (N.J.S.) (State of New Jersey 2002). The Act was established in 1971 and, except for some minor aspects, has not been substantively amended since its effective date. Pursuant to N.J.S. 8A:1-1, the New Jersey Cemetery Board (Cemetery Board) administers the Act and regulates all cemetery companies and their property as well as property rights, equipment, and facilities as required under the provisions of Title 8A. As part of the Division of Consumer Affairs in the Department of Law and Public Safety, the Attorney General oversees all actions and proceedings of the Cemetery Board.

Since Potter's Field was an inactive and largely forgotten burial ground, there was always some question as to whether the Potter's Field was a "cemetery" as defined in the Cemetery Act. There was, however, no question that the disinterment was subject to N.J.S.A. 8A:8-3 (Removal of bodies and sale of lands; consents required; court order; procedure) and the jurisdiction of the Cemetery Board. There was also no doubt that the Turnpike Authority needed to obtain approval of the Chancery Division of the Superior Court of New Jersey for the disinterment and reinterment. As such, the Turnpike Authority initiated a lawsuit seeking approval from the Court and naming the Cemetery Board as a defendant in the litigation.

5. Legal Proceedings and Court Order

In accordance with N.J.S.A. 8A:8-3, on August 21, 2002, the Turnpike Authority through its legal counsel filed a Verified Complaint with the Chancery Division of the Superior Court in Hudson County for approval of a Court Order permitting the Turnpike Authority to disinter the human remains buried in Potter's Field for the purpose of constructing the Secaucus Interchange. The matter was assigned Docket No. HUD-C-115-02. Given the number of potential remains in Potter's Field (estimated at 3,500 burials) and the lack of information to identify the descendents of persons buried there, the New Jersey Turnpike Authority, the plaintiff, named the following as defendants in their case:

- any living, lineal descendents of any person or persons buried in the Former Burial Ground associated with the former Hudson County Almshouse or poorhouse, the former Hudson County mental hospital, the former Hudson County isolation hospital or the former Hudson County penitentiary, all formerly located at Snake Hill (also known as Laurel Hill) in the Town of Secaucus, Hudson County, New Jersey;

- The New Jersey Cemetery Board; and

- The State of New Jersey, in its capacity as representative of the general public of the State of New Jersey.

Also on August 21, 2002, the Turnpike Authority filed a motion in accordance with N.J.S.A. 8A:8-3 seeking an Order to serve process upon the descendant defendants by way of a notice published in a local newspaper notifying them of the Court hearing date. Pursuant to the N.J.S.A. 8A:8-3, the Honorable Thomas P. Olivieri, P.J.Ch., accepted testimony, evidence, and heard oral arguments in support of and in opposition to the relief sought by the Turnpike Authority on September 13, 2002. In attendance were counsel for the Turnpike Authority, the Deputy Attorney General representing the New Jersey Cemetery Board and the State of New Jersey, and Gennaro and Patrick Andriani (the Andrianis), descendants of Leonardo Andriani who was believed to be buried in Potter's Field. On September 25, 2002, an Order to Show Cause allowing the plaintiff to serve process upon descendant defendants by way of a publication in local and national newspapers, and requiring the Turnpike Authority to make the Register of Burials for Potter's Field available on its internet website, was approved by the Judge Olivieri and an additional Court hearing date was established. In addition, Judge Olivieri permitted the Andriani's to participate in all Court proceedings as named defendants.

Judge Olivieri held three additional Court hearings in this matter on November 1, 2002, December 6, 2002, and January 17, 2003, in order to review the evidence and hear oral arguments in support of and in opposition to the disinterment and reinterment of burials in Potter's Field. The Final Order and Judgment in the case was entered by Judge Olivieri on January 31, 2003 (Appendix A). The Final Order and Judgment authorized the disinterment of the human remains in Potter's Field in accordance with the Disinterment/Reinterment Plan dated November 20, 2002, prepared by The Louis Berger Group, Inc., and performance of the reinterment in accordance with the Detailed Reinterment Plan dated January 2003 prepared by Paulus, Sokolowski & Sartor LLC. It was further ordered that the Turnpike Authority would create a trust fund dedicated solely to the perpetual maintenance and preservation of the graves used for the reinterment and memorial monument, landscaping, and other improvements installed at the reinterment cemetery by the plaintiff in accordance with N.J.S.A. 8A:4-2. In addition, the Order also noted that the Turnpike Authority was responsible for obtaining any permits and approvals from state, region, county, or municipal entities as required by law or regulations.

Two modifications to the Final Order and Judgment were subsequently entered by Judge Olivieri (see Appendix A). The first Order Modifying the Final Order and Judgment was entered on July 16, 2003, authorized the Turnpike Authority to leave undisturbed and in place any and all potential burials within Potter's Field that may be located beneath the existing New Jersey Turnpike roadway, embankment, and bridge structures. In addition, this Order modified the sequencing of the reinterment process (placement of burial vaults) and authorized Berger's archaeological team to place the containers of remains in the reinterment burial vaults along with coffin remnants disinterred from Potter's Field.

A Second Order Modifying the Final Order and Judgment was entered by Judge Olivieri on October 10, 2003, approved Maple Grove Park Cemetery in the City of Hackensack, Bergen County, New Jersey, as the cemetery to be used for the reinterment of the remains disinterred from Potter's Field. This modification was necessitated by unforeseen circumstances that arose at the originally intended reinterment cemetery in Hudson County. This Order further modified the sequencing of the reinterment process regarding the placement of burial vaults, containers, and closing of the vaults at the new reinterment cemetery.

CHAPTER 3. ENVIRONMENTAL SETTING

A. LOCATION

The Potter's Field project area is situated in Secaucus, Hudson County, New Jersey, approximately 2,800 feet (853 meters) from the eastern bank of the Hackensack River. It is bounded on the north by New County Road, coinciding with the northern boundary of Hudson County property; to the east by NJTransit's Bergen County Line/Main Line; to the south by wetlands, the New Jersey Turnpike, and Amtrak's Northeast Corridor Line; and to the west by a pond and wetlands (Plate 3-1).

B. PHYSIOGRAPHY, GEOLOGY, AND SOILS

The project area is located in the Piedmont Lowlands Physiographic Province within the Newark Basin region in northeastern New Jersey (Wolfe1977) (Figure 3-1). The Piedmont is sandwiched between the Coastal Plain to the southeast and the Highlands to the northwest, and is primarily drained by the Passaic and Hackensack basins in the east, and the Raritan basin and its tributaries in the south and west. The Piedmont lowlands are principally underlain by Triassic and Jurassic age shale, siltstone, and sandstone formations, and are punctuated by Jurassic age igneous ridges of the Watchung and Sourland Mountains, the Palisades, Snake Hill, and several smaller features.

The project area lies within the Hackensack River valley, a low-lying portion of the Piedmont that includes the Meadowlands, a tidally influenced wetland formed from the relict basin of Glacial Lake Hackensack. Surface soils are developed from the underlying Brunswick shale formation in combination with glacial outwash clasts.

To date, no soil survey has been prepared for Hudson County, largely because the majority of the county would be classified as urban land in which the natural soils have been removed or reworked. The soils found in the project area and vicinity consist of sulfaquents-udorthents-psamments (Figure 3-2; NJ036). This combination of soil types is nearly level and very poorly drained on tide-flooded flats. Sulfaquents are defined as very poorly drained soils over marine sediments and psamments are characterized as well drained sandy fill. Udorthent soils occur in areas that have been cut, filled, or otherwise disturbed (Goodman 1995:9-10). In general, project soils are dominated by hydric loamy sand with little to no horizon development. On top of these original soils, fill and in some instances dredge materials have been placed, which have been used to create urban land for the development of buildings and transportation corridors.

Less than 2,400 feet (731 meters) west of Potter's Field is the rocky prominence known as Mount Pinhorne, Snake Hill, and, most recently, Laurel Hill. Composed of diabase and heavily quarried over the past 40 years, Laurel Hill today retains less than a quarter of the mass it had during the occupation of Snake Hill by the Hudson County institutions associated with Potter's Field. Reaching over 200 feet in height, Snake Hill would have been especially imposing because of the flatness of the surrounding Meadowlands. In fact, in the 1890s, Mortimer Remington of J. Walter Thompson was inspired by the outcropping hill of rock known as Snake Hill on a train trip from New York to Newark, and the image of the rock was used to create the Prudential Insurance Company's Rock of Gibraltar logo, which is still used today.

C. HYDROLOGY AND DRAINAGE

The principle drainage feature in the project vicinity is the Hackensack River, which flows about 2,800 feet (853 meters) west of the project area and joins with the Passaic River at the top of Newark Bay, almost 4

PLATE 3-1: Aerial View of Project Area and Vicinity. View to West

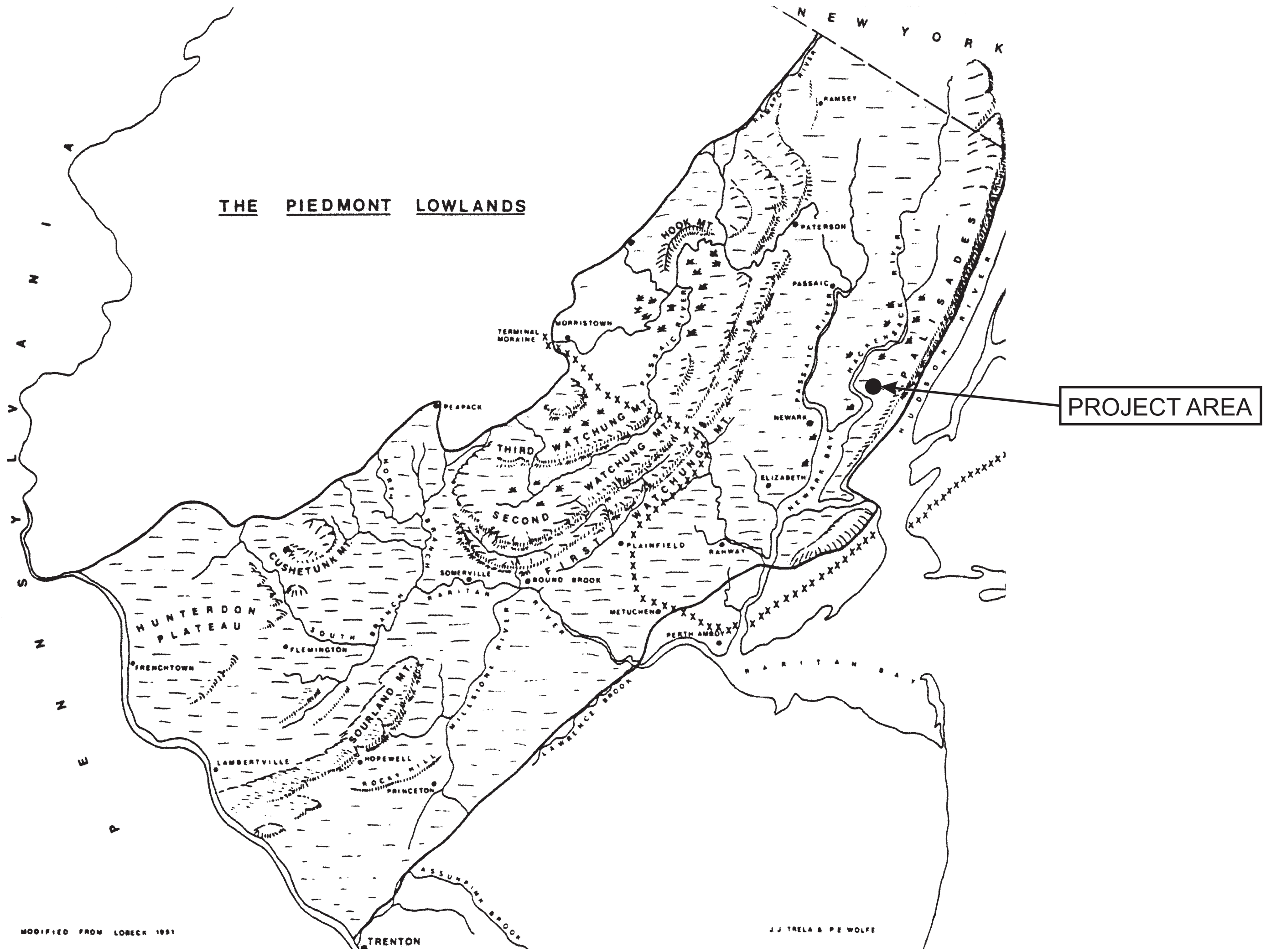


FIGURE 3-1: Physiographic Setting of Project Area

SOURCE: Wolfe 1977

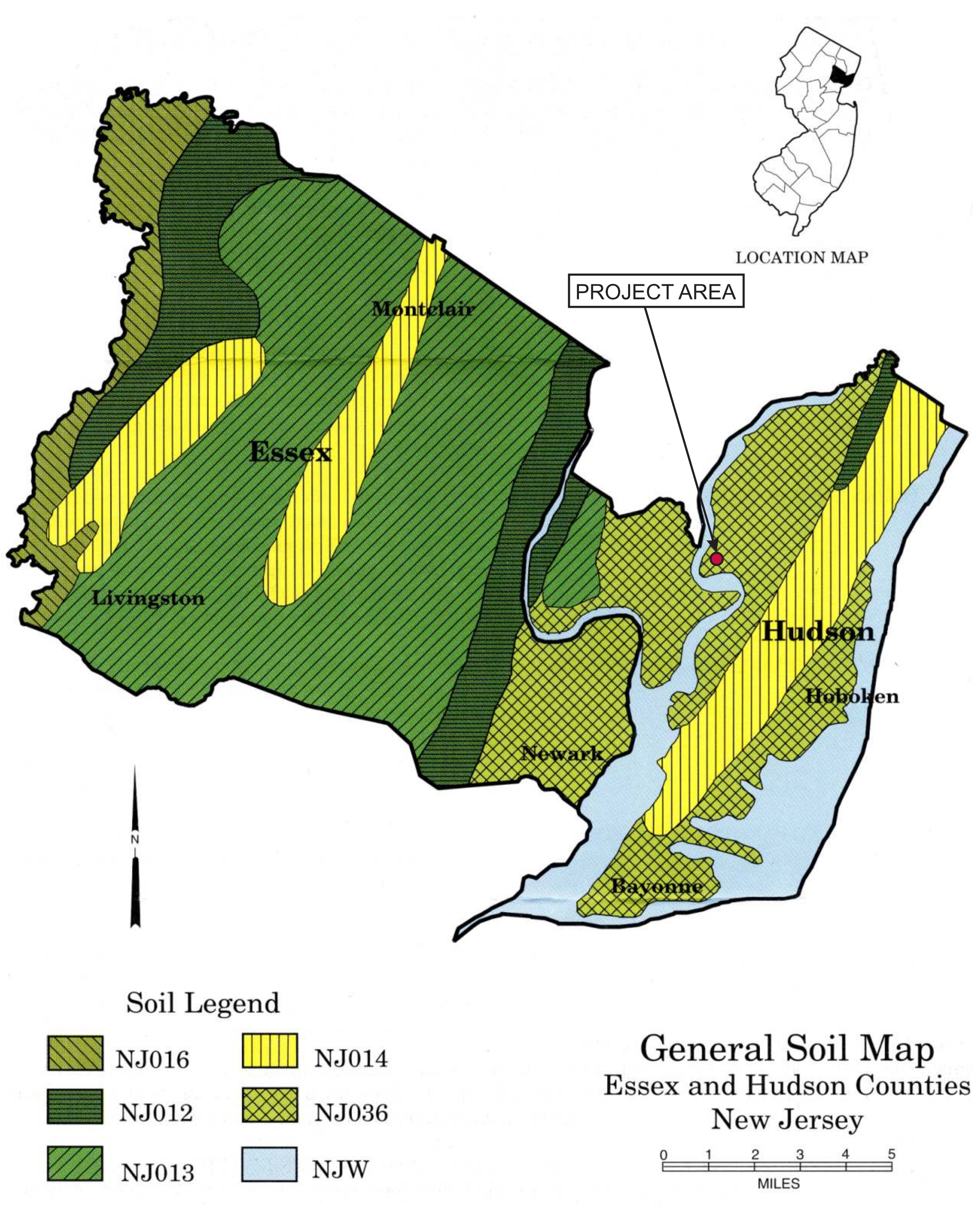


FIGURE 3-2: General Soil Map of Project Area and Vicinity SOURCE: SCS 1993

miles to the south. This portion of the river characterizes the Meadowlands, a 30.4-square-mile area encompassing 10 communities in Bergen County and four in Hudson County, including Secaucus.

> …the significance of the Meadowlands lies in it being one of the largest wetland complexes remaining in the HRE ecosystem, as well as being one of the largest contiguous blocks of open space in the highly developed landscape of the New York City metropolitan area. The approximately 8,400 acres of remaining wetlands and waterways are especially significant for concentrations of federal trust wildlife species (NJMC 2004).

In general, this portion of the Hackensack River and its surrounding expanse of tidal marshes comprise a brackish estuary influenced by semi-diurnal tides (NJMC 2004:5-5). As such, the surface water features, such as the tributary creeks and streams, are influenced by the tidal flow. One of the largest tributaries in the general project area is Penhorn Creek about 0.5 mile to the south. It flows in a south-southwesterly direction before joining the Hackensack River approximately 2 miles southwest of the project area.

At the southern limits of the project area are a tidally influenced unnamed stream and wetlands separating the Turnpike's right-of-way from the Amtrak's Northeast Corridor Line. In addition, immediately adjacent to the western periphery of the project area is a 5.0-acre pond with an easterly trending outflow drainage channel that flows through the middle of the project area. Historic maps indicate that this pond was a swampy meadow prior to 1950. The origin of the drainage channel in the project channel is uncertain but may likely have been part of the construction activities associated with the detention center facility.

D. CLIMATIC CONDITIONS

The project area, along with New Jersey as a whole, is located in an area of Continental-type climate, characterized by significant variation between summer and winter temperatures and by relatively large daily fluctuations in temperature (Robichaud and Buell 1973:55). The climate of central New Jersey is generally temperate with pleasant summers and somewhat mild winters. The mean summer maximum temperature is 85.7 degrees F with winter mean lows at 23.5 degrees F. The record summer high is 105 degrees F and record winter low is -8 degrees F. During the 30 year period from 1961 to 1990, average annual rainfall at Newark International Airport was 43.9 inches (NOAA 2004). The total precipitation for 2003, the period of the Potter's Field disinterment effort, was 62.35 inches, or 12.56 more than the normal (ONJSC 2004). The monthly precipitation totals for 2003 are indicated in Table 3-1. Additional information and a more detailed discussion of the extreme weather conditions in the Secaucus area in 2003 is presented in Chapter 5.

TABLE 3-1

MONTHLY PRECIPITATION TOTALS, 2003, NORTHEASTERN NEW JERSEY

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	Departure from Normal
ANNUAL	2.92	4.27	4.47	2.87	3.94	9.93	3.53	6.50	7.31	5.85	4.30	6.46	62.35	12.56
MEAN*	3.40	3.05	3.90	3.87	3.95	3.96	4.63	4.45	4.05	3.61	3.55	3.56	45.98	
NORMAL†	4.02	2.97	4.11	4.24	4.72	4.31	4.72	4.36	4.68	3.79	4.09	3.79	49.79	

* Mean based on values from 1895-2002
† Normal based on values from 1971-2000

E. FLORA AND FAUNA

Prior to the field effort, the Potter's Field project area could be best characterized as an early successional plant community surrounded by low-lying wet terrain (Plate 3-2). Dominant species in the upland or dry portions of the site included herbaceous plants, small shrubs, saplings, and young woody trees (Plate 3-3). In the wetlands, marshes, pond, and poorly drained areas, dense stands of Phragmites or common reed were present (Plate 3-4). Generally, Phragmities is an indicator of disturbance or man-made modifications to the landscape. Other wetland plants included sedges, grasses, and the marsh mallow, which was most noticeable in late July and August when it produced pink blossoms (Plate 3-5). In colonial times, a confection (the original marshmallow) was made from the roots of the "true" marsh mallow plant. A few wildlife species including some birds, reptiles, and amphibians typical of those found throughout the Meadowlands also were encountered within the project area (Plate 3-6 and 3-7).

PLATE 3-2: Southern Portion of Project Area Showing Upland and Poorly Drained Areas. View to East.

PLATE 3-3: Herbaceous Vegetation and Young Saplings in Project Area

PLATE 3-4: Existing Wetlands and Herbaceous Vegetation Along Eastern Periphery of Project Area. View to East

PLATE 3-5: Marsh Mallow in Bloom Along Eastern Periphery of Project Area

PLATE 3-6: Common Snapping Turtle

PLATE 3-7: Canadian Geese

CHAPTER 4. HISTORICAL RESEARCH

A. INTRODUCTION

The purpose of the historical research component of the Potter's Field project was to describe the historic context of the project area, its relation to the Hudson County Institutional Complex, and the chronological function and use of the Potter's Field project area. An important aspect of this research was the identification and collection of additional maps, surveys, photographs, literature, and deeds. Relevant information was found at the following institutions:

- The Special Collections Archives at Alexander Library, Rutgers University, New Brunswick, New Jersey
- New Jersey Historic Preservation Office, Trenton, New Jersey
- The Jersey City Public Library, Jersey City, New Jersey
- New Jersey State Library, Trenton, New Jersey
- New Jersey State Archives, Trenton, New Jersey
- Department of Vital Statistics, Trenton, New Jersey
- Hudson County Department of Public Resources, Secaucus, New Jersey
- Hudson County Department of Engineering, Secaucus, New Jersey
- Secaucus Public Library, Secaucus, New Jersey
- Secaucus City Hall, Secaucus, New Jersey
- Hudson County Courthouse, Hudson County Register of Deeds, Jersey City, New Jersey
- New Jersey Room, Jersey City Free Library, Jersey City, New Jersey
- Guggenheim Library at Monmouth University, Long Branch, New Jersey
- Map Room of the New York Public Library, New York

B. HISTORY OF HUDSON COUNTY AND THE PROJECT AREA

1. Hudson County

European settlement of present-day Hudson County, initially part of Bergen County, began in the early seventeenth century. As early as 1611, two years after Henry Hudson explored the river that bears his name, the Dutch began to establish small, impermanent trading posts on the west side of the Hudson. Larger settlements granted to individuals known as "patroons" were an attempt to replicate the feudalistic settlement patterns of Europe. One of these settlements occurred in 1629 when the West India Company granted the Patroonship of Pavonia to Michael Pauw of Amsterdam (Wacker 1975:238-239).

In July 1630 the Dutch purchased all the land lying between the Hudson River on the east, the Hackensack River and Newark Bay on the west, and the Kill Van Kull Creek on the south from the Hackensack Indians, a subgroup of the Lenape. During the 1630s and early 1640s Dutch settlers, as well as significant numbers of Walloons and French Huguenots, established themselves in the vicinity of Bergen and Paulus Hook (now part of Jersey City) and in areas to the north between the Hackensack and Hudson rivers (Shaw 1884:931; Wacker 1975). Large-scale permanent colonization of the area west of the Hudson River was delayed by a series of Indian-Dutch wars between 1643 and 1655, which resulted in the destruction of many of the Dutch settlements, including Hackensack. With the cessation of the hostilities, settlement resumed. The Dutch extended their presence further into the Piedmont, generally following the Passaic and Hackensack valleys (Wacker 1975:126).

The Dutch tract purchased in 1630, called "Hobocan Hackingh" by the Indians, included a huge mass of land west of Manhattan Island that was bounded by the Hudson River and swamps further inland. The 1656 Visscher Map of the Eastern Seaboard depicts the area as undeveloped land known as "Sanhicans." In 1658 Governor Peter Stuyvesant renegotiated the purchase to ensure order and protect against disputes over ownership in the future. These conditions, however, were to be short-lived as in 1664 the British took control over New Netherland, which at that time included New Jersey. During a brief period in 1674 the Dutch regained control of the area, and it was during that time, according to colonial records, that the Indians declared:

> "Sicakus [Secaucus] a small island situate behind Bergen, was not sold, but only Espatingh and its dependencies, and that other Indians blamed them for having sold land that was not theirs; whereupon the deed of purchase being examined and arguments further heard, they find the aforesaid island to be included in the sale made in January, 1658, but not in sale of the land of Espatingh, which being interpreted and explained to them by Saartie van Bersim, they say they did not know it; propose that they ought to have a present of an anker of rum, which those interested, in order to obviate further difficulty, have consented to give them" [cited in Wacker 1975:92].

This incident, perhaps more than any other, illustrates the cultural divide that existed between the European and aboriginal concepts of land ownership during the colonial period.

In June 1664 the Duke of York granted all lands between the Atlantic Ocean (including part of the Hudson River) and the Delaware River to John, Lord Berkeley, and Sir George Carteret (Cunningham 1992:22, 24). It was on the basis of these grants that New Jersey became divided into East Jersey and West Jersey in 1676, with Carteret's land (and the current project area) located in East Jersey. In the same year that New Netherland was wrested from the Dutch, British colonists had begun to migrate to eastern New Jersey, mainly from New England and the Puritan settlements on Long Island. Although a number of English-speaking islands were formed among the Dutch of Bergen County, most British/New England settlers established themselves further south, in Newark and Elizabeth (Wacker 1975).

After the British regained permanent control of the area from the Dutch at the end of 1674, land disputes between Indians and Europeans and between royal governors Berkeley and Carteret and settlers continued (Wacker 1975:95). Eventually, all conflicts were resolved, and the expansion of land ownership and settlement accelerated toward the end of the seventeenth century. Land speculators purchased enormous tracts of land, which they subdivided into smaller parcels and sold to individual settlers.

The earliest historic settlement of the project area dates to around 1679, when Judge William Pinhorne purchased the southern half of an approximately 4,000-acre parcel belonging to land speculators Nicholas Varlet and Nicolas Bayard (Geismar 1992:19-21). The Pinhorne Plantation included Snake Hill or "Slangen Bergh" and a rise of land referred to as Mount Pinhorne. "According to some accounts, the area was named…because the bordering marshland was infested with black water snakes" (NJMC 2004:2-4). By 1729 the Pinhorne plantation consisted of 200 acres of cleared land, about 600 acres of timberland, and 1,000 acres of meadow. A house and barn stood on the property, and there were two large orchards of about 1,200 apple trees (Shaw 1884:946). The house was fairly modest, consisting of "two lower rooms and a lean-to below stairs and a loft above" (Winfield 1874:127). In addition to the property and buildings, Pinhorne also received "one-half of the stock," which included "one hors, one mare and two coults, eight oxen, ten cows, one bull, foure yearlings and seven calves, between thirty and forty hoggs, foure negro men and five christian Servants" (Winfield 1874:126-127). The disproportionately large amount of "hoggs" illustrates the importance of pig-farming on the property, a phenomenon that would continue well into the twentieth century. It appears that Pinhorne raised tobacco on the farm, since "five tobacco houses" were among the outbuildings included in the original purchase. The property apparently stayed within the Pinhorne family until at least the latter half of the eighteenth century.

In 1682 East Jersey was divided into the four counties of Bergen, Essex, Middlesex, and Monmouth. In that same year Bergen County, comprising all the land between the Hudson and Hackensack rivers, was divided into the townships of Bergen and Hackensack. In 1710 New Barbados Township, formerly part of Essex County, was added to Bergen County (Snyder 1969:75). In 1840 Hudson County was created from the southern portion of Bergen County. When separated from Bergen County, Hudson County comprised the townships of Bergen, Harrison, and the city of Jersey City, and many villages that later became separate municipalities (Snyder 1969:145).

Bulls Ferry, located in what is now part of North Bergen Township in Hudson County, was an important early transportation link between Manhattan and New Jersey. A blockhouse built at Block House Point, south of Bulls Ferry, by British sympathizers (Tories) during the Revolutionary War was used as a base of operations to supply the British troops in Manhattan with vital stores. The British troops particularly needed firewood, which was in abundant supply along the Palisades in New Jersey, and the blockhouse was used to store the wood. It became a target for the Americans (Patriots), who were intent on cutting the British off from their supplies. In 1779 a battle was fought at the blockhouse between the Tories and the Patriots. In the end, the Tories successfully defended the blockhouse (Kruglinski 1992:17-18).

The population of Hudson County increased in the period between the Revolutionary War and the mid-nineteenth century. As interior markets developed, goods continued to be shipped to New York City. Market and transportation centers, especially those close to New York, were developing into important transshipment points and were becoming urbanized (Research and Archaeological Management Inc. 1989:15).

The growth of Manhattan as a commercial, financial, and industrial center throughout the nineteenth century encouraged the development of transportation, commerce, and industry in Hudson and Bergen counties. The geographical landscape of Bergen County, with its high cliffs overlooking the Hudson River and small strip of waterfront, however, made it initially less desirable to developers than Hudson County. For these reasons much of Bergen County remained sparsely settled and agricultural throughout the nineteenth century. Residential and industrial growth occurred at a relatively slow pace in the county. Not until the late nineteenth century, with the completion of railroad access to the eastern side of the Palisades and increasing use of electricity in the 1890s, did industries locate in the communities of Hudson and Bergen counties situated along the Hudson River.

2. History of the Hudson County Institutional Complex

Sometime toward the end of the eighteenth century or the early nineteenth century, the Pinhorne estate was parceled and sold to outside investors. In 1820 land speculator Albert A. Westervelt purchased 200 acres of the old Pinhorne estate from Job Smith. That same year Westervelt sold the property to Abel I. Smith, who in turn sold it to the Freeholders of Bergen County. It was here that the Bergen County Poorhouse Farm would be established. In 1826 the Freeholders bought an additional 74 acres from New York land speculators Samuel, John, and Robert Swartwout, giving the poorhouse farm a total of 274 acres (Geismar 1992:24-25). It is possible that the cost of constructing the poorhouse was covered by a lottery, which was a common way to fund the construction of roads, schools, churches, and other public facilities during the late eighteenth/early nineteenth centuries (Winfield 1874:283).

In the beginning of the nineteenth century a decided shift took place in the attitudes and methods of the societal role in providing for the general welfare of the population, even those outside the dominant working and upper classes. Technological and scientific advances, particularly in medicine, allowed for the treatment of myriad illnesses, both physical and mental, that had heretofore been beyond the reach of the scientific community. This ranged from a greater understanding of the causes of disease, to better trained, full-time physicians, to institutions devoted solely to the care of the indigent or infirmed.

Prior to around 1850 conditions in many New Jersey state institutions were horrific. Famed activist Dorothea Dix became an advocate for improving conditions in New Jersey, particularly in insane asylums but also in prisons and poorhouses. She personally documented the barbaric treatment of the mentally ill around the state, which included beatings, neglect, and lockdowns in filthy cellars. As a result, the New Jersey State Lunatic Asylum was built in Trenton (Mappen 2003). Other new asylums were built in counties around the state, and one of these was the Hudson County Insane Asylum in 1873 (Reed and Henkel 1950:94).

The Hudson County Insane Asylum, however, was not the first county institution in the area. The county poorhouse had been established in the early 1820s, as described above, and the original building completed sometime prior to 1826 (Reed and Henkel 1950:93). For the next 50 years this property was known as the "poor-house farm." The 1849 Sydney *Map of New York City and Twelve Miles Around* shows the poorhouse as being situated approximately 1,000 feet northeast of the Potter's Field project area. This building, described as a "large red building," stood just north of the Boonton Branch Railroad along County Road until at least as late as 1950 (Reed and Henkel 1950:93).

This institution, like other contemporaneous poorhouse farms, was largely self-sufficient. Inmates of the facility contributed to their own maintenance by providing the labor and supervision necessary for raising animals and crops on the property. The raising of pigs on the farm had been a long-standing practice in the Secaucus area since the earliest days of European settlement. Statistics from poorhouses in other parts of the country also show pork to have been a leading product of the farms; perhaps this was because of the resiliency of pigs as a species, their diverse, unspecialized diet, and the minimal attention needed for successful propagation. Poorhouse farm inmates also engaged in other labor activities, such as carpentry, spinning, weaving, coopering, and manufacturing. Most of the tools used on the farm and in the facility, along with the shoes and clothing worn by the inmates, were made on site. The age and health of an inmate would usually dictate which task he or she was assigned to perform. Conditions were humane but hardly desirable. While the primary motivation behind the poorhouse was to care for the poor, a secondary intent was to discourage pauperism among those able-bodied individuals capable of supporting themselves (Katz 1996:25).

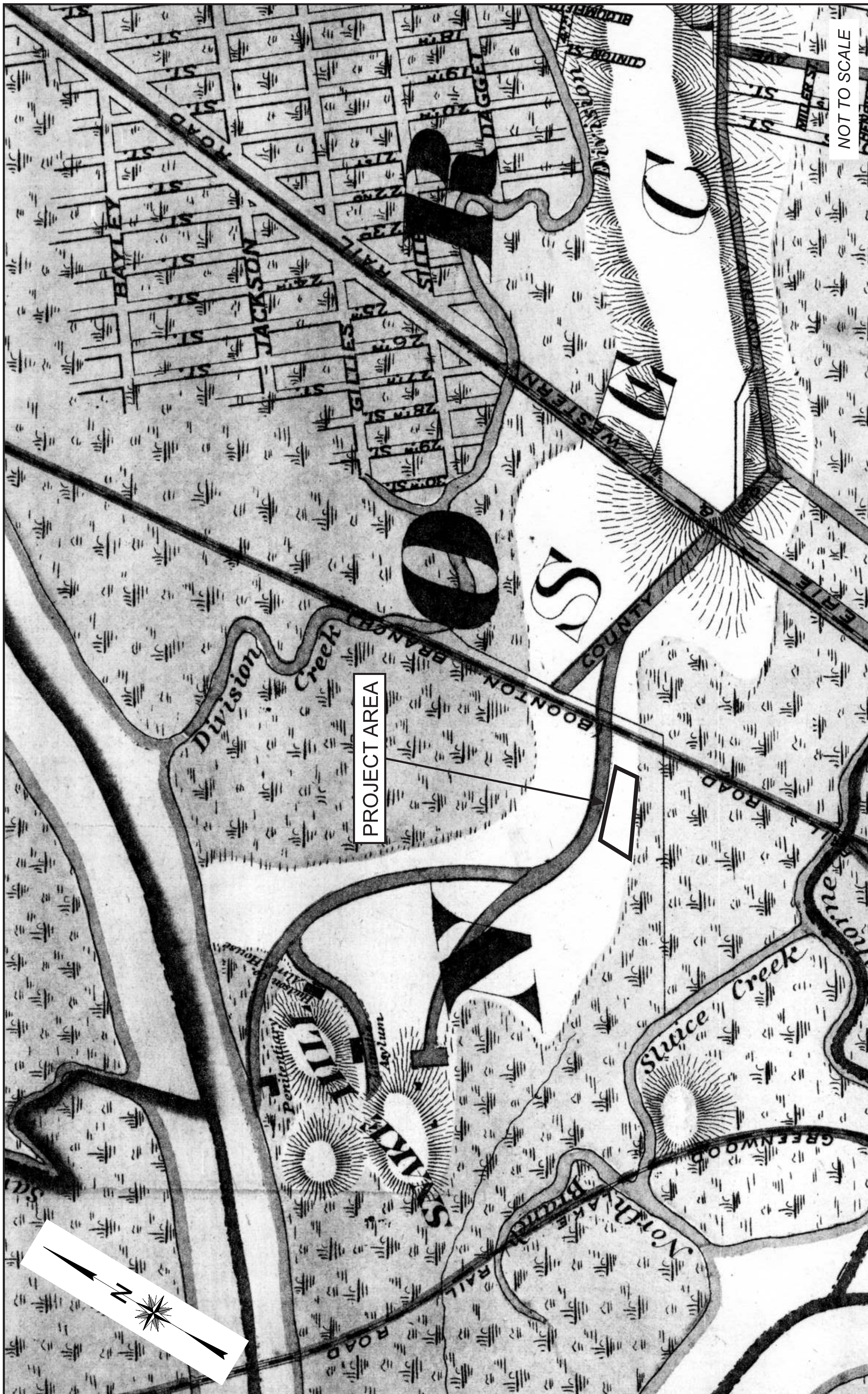
In 1840 the state legislature enacted the legislation officially establishing Hudson County, separating it from Bergen County (Shaw 1884:943), but it would be several years before ownership of the poorhouse property would be transferred to Hudson County. Toward the end of 1845 county officials began to formulate plans to purchase the property. It was not until the end of 1855, however, that the Board of Chosen Freeholders officially voted to acquire the tract. In February 1862 Hudson County took possession of the property for the sum of $12,000. Almost immediately, plans were made to build an almshouse on the site. Carpenter James McLoughlin and mason William C. White were hired for fees of $14,600 and $12,500, respectively. The building was completed in 1863 and had an inmate capacity of 500. The first inmate, Andrew Donohoe, was admitted on August 25, 1863 (Shaw 1884:946). By November 19, 1873, an astounding 2,840 persons were living in the almshouse; of these, 1,700 were males and 1,140 were females. The average age for the inmates was 30 years, 6 months. Although a plurality of the inmates were American (N=1,242), the majority were foreign-born, including 1,154 from Ireland, 310 from Germany, and 104 from England (Winfield 1874:321).

Within two years plans to construct a penitentiary near the almshouse were formalized. On August 9, 1866, a contract totaling $83,456 was awarded to Peter Doyle and David Ewling. The prison was completed in 1870, with Patrick Warren serving as its first warden. On September 19, 1870, Michael Kinney became the first inmate, resulting from his conviction on charges of breaking and entering and larceny. By the end of 1873 a total of 1,013 people were incarcerated in the penitentiary; of these, 786 were male and 227 were female. Although the majority were literate (N=703) as opposed to illiterate (N=310), most were unskilled laborers (N=680) as opposed to individuals with some type of trade (N=333). Unmarried persons were over-represented in the prison population: 641 compared with 372 who were married. The profile of the prison population also appears to have been greatly influenced by immigration trends of the period. Only a third were American born (N=309) as opposed to two-thirds who were foreign-born (N=704). Most telling is the inmate breakdown by religion: 742 Catholics, 267 Protestants, and 4 Jews (Winfield 1874:322). This is suggestive of the large numbers of poor Irish Catholics who emigrated to the United States during the second half of the nineteenth century. The recidivism rate of the inmates was also relatively high, as almost half of those incarcerated were repeat offenders (Winfield 1874:322).

Shortly after the opening of the penitentiary, the county continued to expand its institutional services with the construction of the Lunatic Asylum in 1873 (Figure 4-1). The building had a capacity of 150 persons and accepted its first inmates on March 8, 1873 (Shaw 1884:946). Between March 8, 1873, and November 19, 1873, a total of 102 patients had been admitted, of whom 15 were "cured and discharged" (Winfield 1874:322). These facilities were soon followed by a number of specialized facilities designed to address a multitude of medical and social needs. The 1906 Atlas of Hudson County (Hopkins) depicts a cluster of institutions located approximately 1,500 feet west of the project area. In addition to the initial almshouse, lunatic asylum, and penitentiary buildings, by that time there were a smallpox hospital, isolation hospital, children's eye infirmary, almshouse annex, and tuberculosis hospital. The latter had a number of smaller buildings, possibly cottages for patients requiring long-term care in an isolated environment. Identified support structures for the institutions included a paint shop, a carpenter's shop, and a laundry. A school was present within the almshouse complex. A vegetable garden located north of the penitentiary and west of the almshouse was the only remaining vestige of the old poorhouse farm that first characterized the site. The St. Joseph's Roman Catholic Church, a Protestant Church, a "P.E." Church, and the Trudeau Theatre are also illustrated behind the asylum on the 1923 Atlas of Hudson County as well as on the 1918 and 1936 Sanborn Insurance Maps (Figure 4-2).

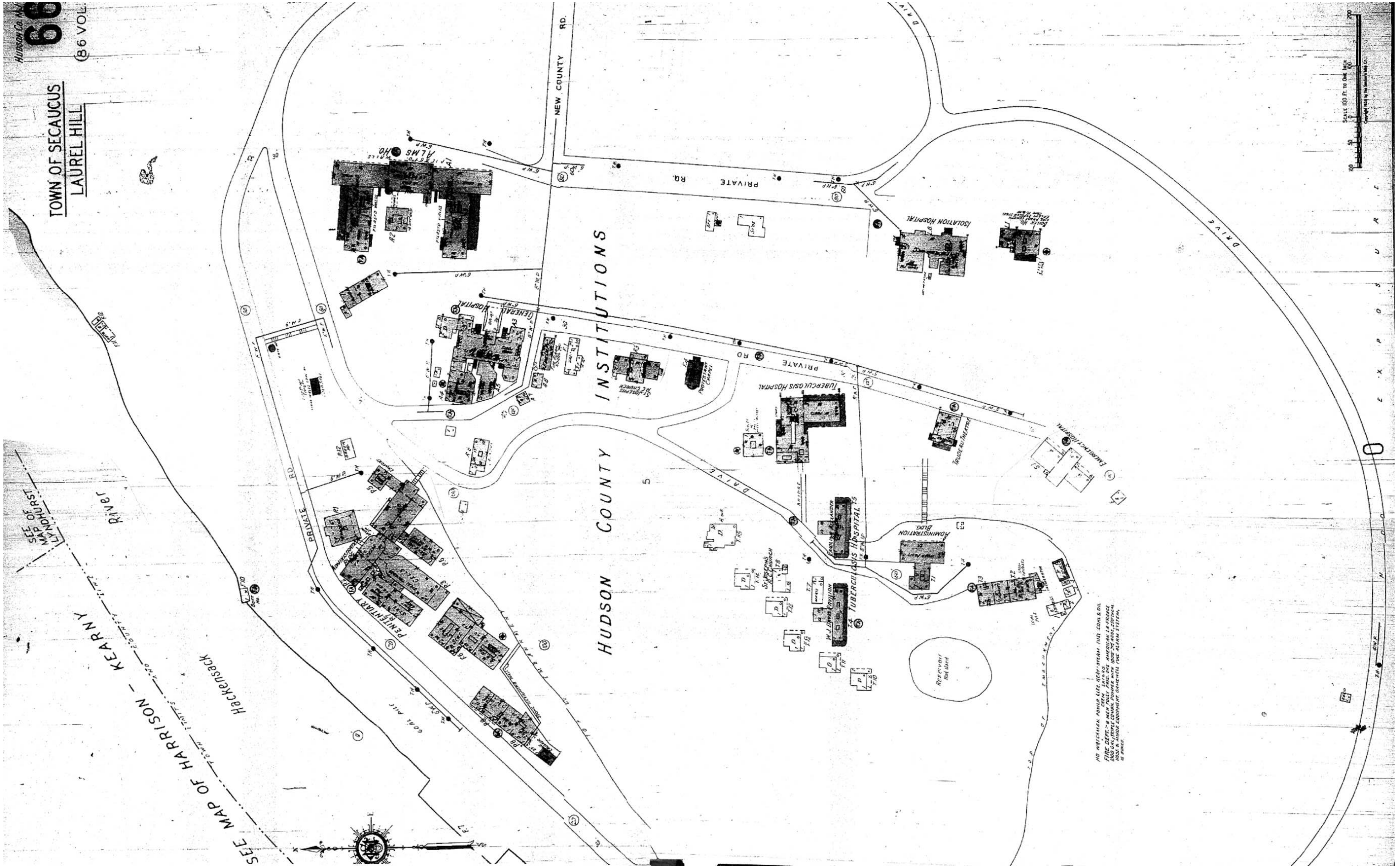
The concept of state institutions intended to address the social problems of a growing, polyglot population has its roots in the early nineteenth century. Many scholars attribute the need for governmental social services to the rise of capitalism and the Industrial Revolution in the United States. Labor, education, incarceration, and even temperance became exercises centered around rigid scheduling and the implementation of strict standards of behavior. No longer were the flexibilities of eighteenth-century work situations and minimal solutions to social problems practical. An expanded working class bound by the demands of wage labor and the factory system resulted in increased numbers of people requiring some form of assistance from the newly emerging social institutions either in the form of relief, hospitalization, or incarceration (Katz 1996:12-13).

Prior to the nineteenth century the poor were dealt with by simply selling them to the lowest bidder, who would care for the individual in exchange for whatever labor could be provided. An excerpt from the minutes of a Bergen County town meeting in 1674 describes one such transaction, "...at a public Outcry is sold Enoch Earle to the lowest bidder for the sum of seven pounds ten shillings; the conditions are as follows: The buyer is to find the said Enoch Earle a good bed, washing, lodging, and such victuals and mending his clothes; the Overseer of the Poor are to find all the new clothes and then the said Enoch Earle is to work for the buyer as much as he is able to until the years end" (cited in Reed and Henkel 1950:94). Methods of addressing other social problems, such as criminality and insanity, were equally bereft of any rehabilitative considerations. Those who broke the law were either fined, whipped, or executed. Incarceration was rarely an option, except when awaiting sentencing or punishment (Katz 1996:11).



SOURCE: Speilman and Brush 1880

FIGURE 4-1: Project Area and Snake Hill, 1880



SOURCE: Sanborn 1936

FIGURE 4-2: Hudson County Institutional Complex, 1936

The system of dealing with social problems in the United States was based on principles borrowed from England. First and foremost, it was a public responsibility; however, it was also a local issue, and came into play only in instances when there were no relatives to assist with whatever care was required. In addition, the concept of state institutions such as poorhouses was believed to be the most economically expedient way of dealing with the poor. During the late nineteenth century demand for the services of poorhouses increased exponentially. Officials of the day pointed to a number of factors as the cause. One report laid the blame solely on intemperance. Others blamed it on the growth of cities. Still others blamed the proliferation of pauperism in the United States on the explosion of immigration from Europe (Katz 1996:16-17). The latter explanation, although borne of the heightened xenophobia of the day, may have the most validity when compared with statistics from the Secaucus institutions. As mentioned earlier, the populations of both the almshouse and penitentiary consisted mainly of foreign-born individuals (Winfield 1874). Conditions in Europe, most notably the potato famine in Ireland, resulted in mass immigration to the United States. Many of these were young men who could no longer make a living in their respective homeland. Their arrival in America with little or no skills, exacerbated the already existing problem of pauperism. A report on public institutions during the nineteenth century concluded that "the increase of pauperism amongst us...is the increase of our foreign population" (cited in Katz 1996:17).

The institutional complex at Snake Hill in Secaucus served the needs of Hudson County throughout the nineteenth century and into the twentieth century. The peak of the activity occurred during the period from 1890 to 1920 (Figures 4-3 and 4-4). After the 1930s the importance of the Hudson County Institutional Complex began to wane. The insane hospital had been moved to the new Meadowview Mental Disease Hospital facility on County Road in 1927. The concept of the almshouse became superfluous by virtue of New Deal programs, which gave poor Americans a financial safety net that no longer necessitated institutional boarding, and by the 1940s and 1950s the Hudson County Almshouse had become a de facto old age home with fewer and fewer residents, generally of an advanced age, in residence with each successive year. This trend had probably began as early as 1900. By 1950 the buildings were used to house a tuberculosis ward for the Mental Disease Hospital, a Boys Camp that was operated by the Jersey City Board of Education, a unit of the Hudson County Fire Department, and as storage for election equipment and county institutional supplies. Two churches were also still present on the site (Reed and Henkel 1950: 94). In addition, the bulk of the patient's records and the institution's administrative files appear to have been transferred to the Hudson County Offices on County Road (Appendix B). Today, the only visible sign for motorists and rail passengers of this former institutional complex is a single smoke stack that rises about 150 feet immediately adjacent to the remnants of Snake Hill (Plate 4-1).

PLATE 4-1: Last Remaining Vestige of Hudson County Institutional Complex, Smoke Stack. View to West

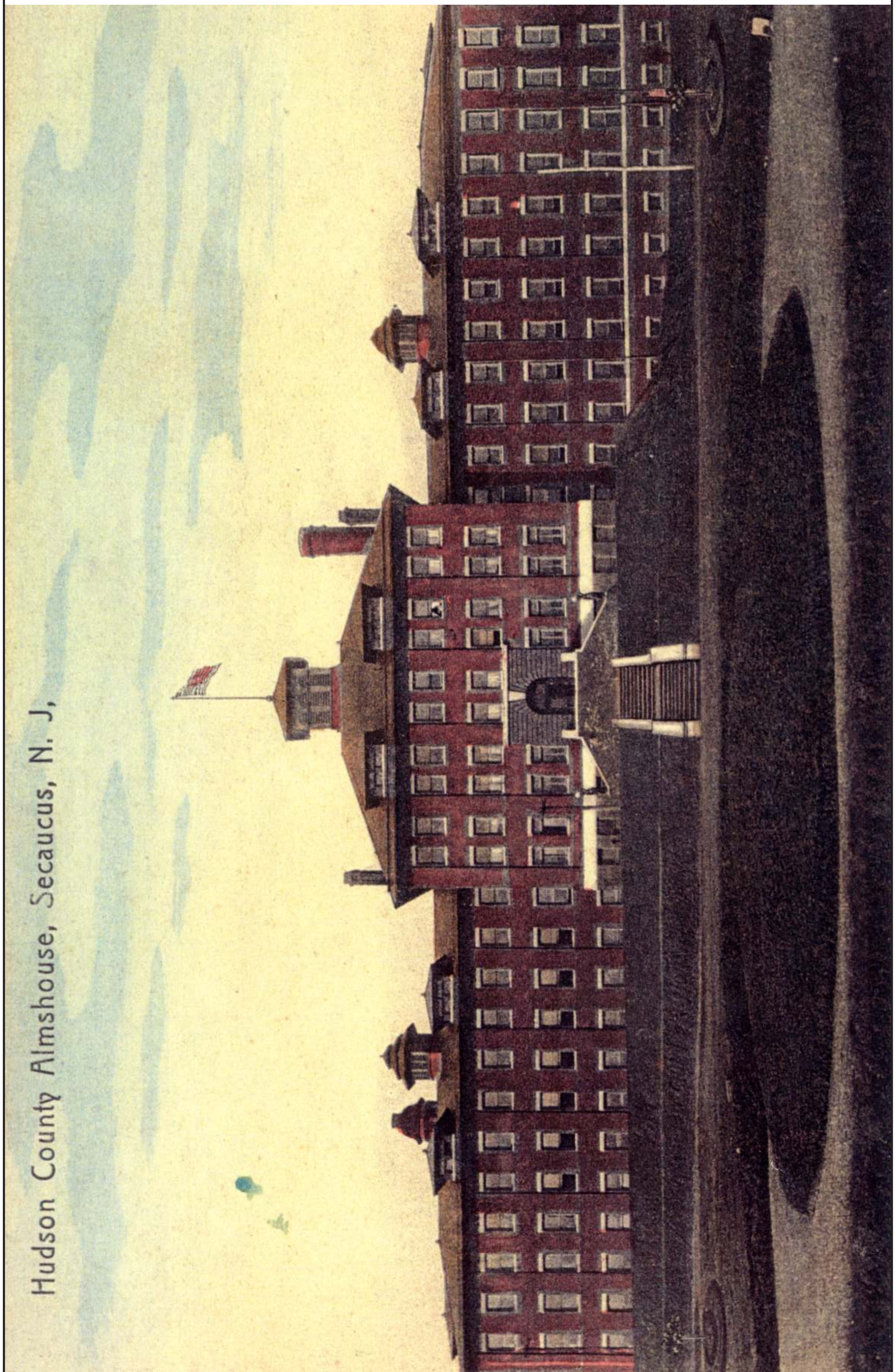


FIGURE 4-3: Circa 1910 Postcard of Hudson County Almshouse, Secaucus

SOURCE: Middletown Historical Society Collection

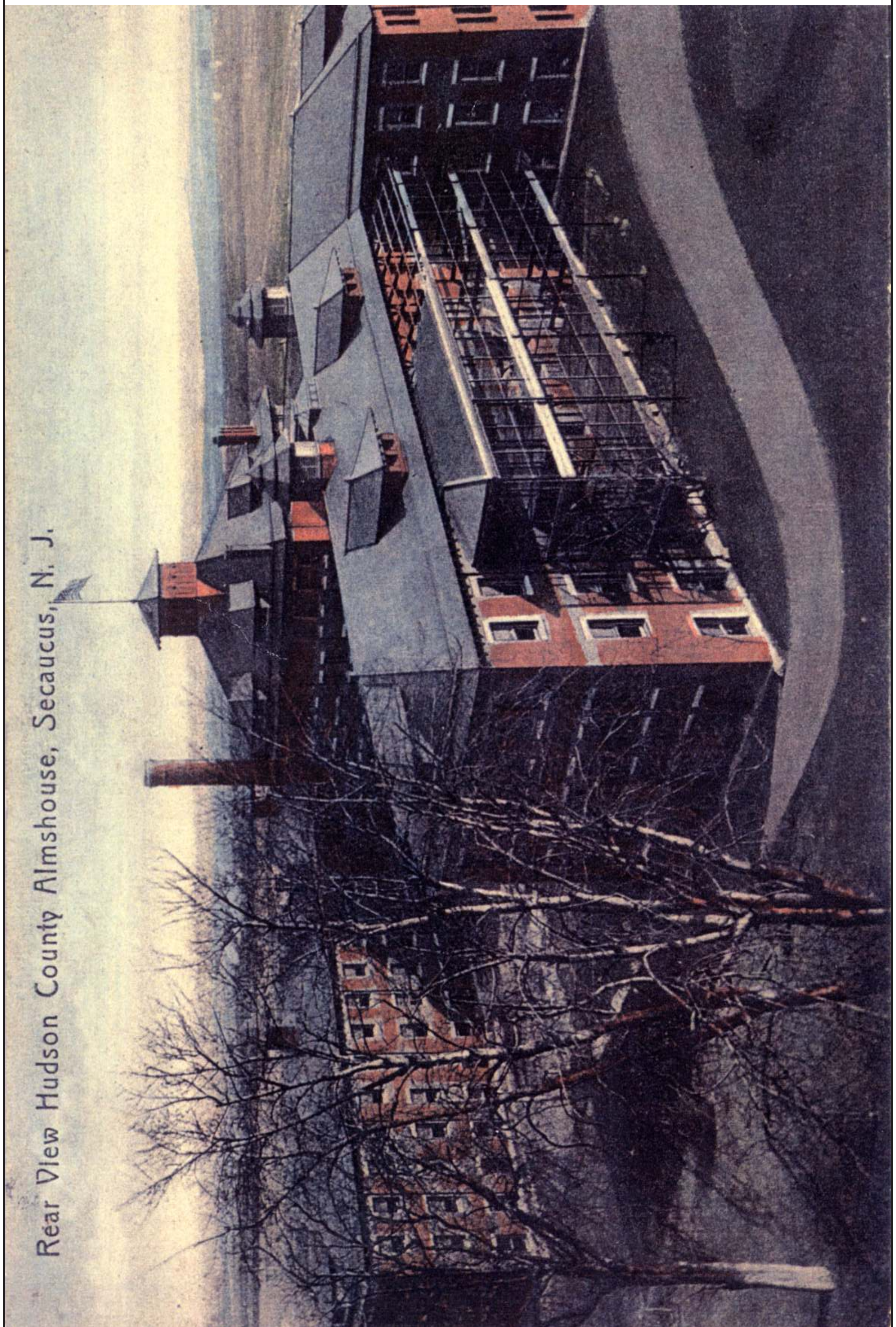


FIGURE 4-4: Circa 1910 Postcard of Rearview of Hudson County Almshouse, Secaucus

SOURCE: Middletown Historical Society Collection

C. FORMER BURIAL GROUNDS OF THE HUDSON COUNTY INSTITUTIONAL COMPLEX

Care for the deceased of the institutional complex began shortly after the first buildings within the complex became operational. The earliest depiction of the former Hudson County Burial Grounds is the 1907 map of the county properties at Snake Hill. This map illustrates the general location of three separate burial grounds with the label "Burial Grounds" as the only point of reference. Two are situated in close proximity to the institutional complex (approximately 600 and 800 feet southeast of the Asylum for the Insane), and the third, and furthest east (about 1,500 feet east of the asylum), is situated beyond a swampy meadow and piggery (Potter's Field project area).

The establishment of three burial grounds associated with the institutional complex is partially supported by the discovery of three Hudson County Burial Registers or burial records. These burial records indicate that the first interment occurred in December 1880 and the final interment in April 1962. The first burial register, comprising 139 pages of hand-written entries, includes interments from December 31, 1881, to March 31, 1908. Hand-written entries in the second burial ledger start in April 1908 and end in June 1941, covering 399 pages — one page for each month of each year. The third and final burial ledger covers the period from July 1941 to April 1962. The exact correlation between the burial ledgers and burial grounds is unclear; it is uncertain whether each ledger represents interments made at one particular burial ground or whether it was simply that a new book was started after the preceding was filled. The information contained in these burial records and their possible correlation to actual interments in the burial grounds formed the basis of the research effort throughout the disinterment program at the easternmost burial ground, Potter's Field, the focus of the current project.

Historically, the former burial grounds of the Hudson County Institutional complex have been referred to as the Snake Hill Cemetery or Laurel Hill Cemetery. Although these burial grounds were used for the burial of deceased from the former institutional complex, individuals unrelated to the county institutions also were buried there. These individuals were the unknown, unclaimed, and/or unfortunate residents of the county. As such, the county saw fit to respectfully care for these unknown and destitute souls at the time of their death by allowing space for them within the county's burial ground. By definition, these pieces of ground appropriated as burial grounds for the destitute and unknown are referred to as "potter's fields." The concept of a potter's field, however, actually dates back to biblical times. According to the Gospel of Matthew 27:6, "Then Judas, which had betrayed Him, saw that he was condemned, repented himself, and brought again the thirty pieces of silver to the chief priests...and they took counsel, and bought with them the potters' field to bury strangers in." Potter's fields were present in every part of the United States dating back to colonial times. Even cemeteries serving the general public would often have sections set aside for the indigent. However, the rise of state-run institutions during the nineteenth century necessitated the creation of potter's fields to serve a growing population of poor people that were concentrated in defined areas.

D. POTTER'S FIELD CARTOGRAPHIC RESOURCES

Limited information was available to the Turnpike Authority and Berger during the early planning stages of the Potter's Field project. These materials included the Hudson County Burial Registers (described above) and various Hudson County engineering maps. Judging from a review of these fragments of information, it was suspected that the Potter's Field project area, the easternmost of the three Hudson County burial grounds, contained an estimated 1,200 graves holding up to 3,500 individuals buried between 1920 and 1962. In order to provide the team with an overall understanding of the land-use history and function of the project area, Berger conducted a detailed cartographic search and review.

The three Hudson County Burial Registers copied from the originals maintained by Hudson County were Berger's primary source of information concerning the people buried in Potter's Field. The Burial Registers detailed, for the majority of entries, date of burial, name, where death occurred, burial plot number, and "Remarks" including the age and position of the deceased within the grave shaft (top or bottom) (Figure 4-5). Initial review of these records indicated that during the first several years of interments at the Hudson County burial grounds the deceased were buried in individual graves. The first recorded grave with multiple burials was recorded in 1883; however, it was still a common until after 1900 to be buried one-per-grave. The trend toward multiple use of a single grave increased through the late 1890s so that by 1903 the majority of interments were occurring in multi-graves; however, a few individuals were still being interred alone until about 1913. According to the burial records, multi-graves typically comprised an upper and lower burial, labeled "top" and "bottom" in the register, with a very small number of burials, almost always stillbirths or infants, labeled "side." On rare occasions four, five, and even six stillbirths were buried in a single grave. As such, the exact number of individuals present in graves at Potter's Field could not be accurately determined prior to the commencement of fieldwork.
The 1841 Douglass Map of Hudson County is one of the earliest detailed cartographic sources illustrating the local terrain of Snake Hill. This map depicts the area east of Snake Hill, including the project area, as fast land surrounded by wetlands. The map depicts no structures, property lines, terrain details, or descriptive land-use of the Potter's Field project area.

The 1849 Sydney *Map of New York City and Twelve Miles Around* shows the original poorhouse, northeast of the project area, but no buildings, structures, or other improvements (ie., roads) in proximity to Snake Hill, Little Snake Hill, or the project area.

A section of the 1873 Hopkins map (Figure 4-6) illustrates the lot divisions, property ownership, and initial development of the area known as the "County Farm." At that time the "County Road" terminated at the Delaware, Lackawanna, and Western Rail Way in front of two buildings labeled "Poor House." Heading westward, an unimproved road is depicted as the main access to the then "Hudson Co Alms House" and "Hudson Co Penitentiary." No structures or features are shown within the Potter's Field project area. This map also illustrates the primary natural features defining the area: the Hackensack River, Snake Hill, Little Snake Hill, Penhorn Creek, Division Creek, and Fish Creek.

One of the earliest available topographic maps of Snake Hill and vicinity is the 1890 15-minute USGS map (Figure 4-7). This map best illustrates the distinctive environmental features that characterized the southern end of Secaucus at the end of the nineteenth century. The land encompassing Snake Hill and Little Snake Hill projects out into the Hackensack River, creating a significant bend in the river. The most striking of all features, however, is the vast expanse of wetlands that characterizes the area, which is only intermittently broken by small pockets of elevated ground. Not surprisingly, development and land use in this area of Secaucus is concentrated within these limited portions of high ground; this map illustrates the Potter's Field project area as a crescent-shaped area rising little more than 10 feet above the wetlands.

The most informative historic map of the project area and vicinity is the *1907 Map of the County Properties at Snake Hill*. This map provides the greatest detail of the buildings within the institutional complex and illustrates the location of the three former burial grounds associated with the Hudson County Institutional Complex. Within or immediately adjacent to the Potter's Field project area (Figure 4-8) are two "pens," a "barn," and a few small unlabeled rectangular-shaped structures situated on the eastern side of a "swampy meadow" that extends south from New County Road to a dirt road that eventually leads back to the institutional complex. This map also depicts a slightly arched line trending from south to northeast that is labeled "edge of high ground." It is within the area labeled "high ground" that the terms

104

November 1916

Date of Burial		Name	Where Died	Lot	Register Folio	Record Folio	Remarks
Nov 1st	1916	John Ward (Colored)	Jersey City #97	4912	✓	/	22 Top
" 1"	"	Albert Williams	Tuberculosis Hospital	4912	✓	/	45 Bottom
" 4"	"	Unknown Man	Hoboken 125	4913	✓	/	43 Top
4	"	Baby Damanouch	" " 123	4993	✓	/	1 Mo 24 Days
4	"	Michael Dwyer	Jersey City 36	4913	/	/	42 Bottom
5	"	Paul Casakovite	Tuberculosis Hospital	4914	✓	/	44 Bottom
5	"	Justine Barakso	Tuberculosis "	4914	/	/	29 Top
11	"	Patrick Malady	Alms House	4915	/	/	50 Bottom
14	"	James McCreary	Jersey City #98	4915	/	✓	35 Top
14	"	Mary Daly	Alms House	4916	/	✓	65 Bottom
23	"	Alfred Ralph	Jersey City #37	4916	/	/	1 day Top
" 23	"	Francis G Hughes	" " #38	4916	/	/	24 Top
" 24	"	Mattie Gdorich	Tuberculosis Hospital	4917	✓	/	27 Bottom
24	"	Mary Simmons	" " " "	4917	✓	/	39 Top
25	"	Joseph Papalina	Hoboken	4905	✓	/	24 Top
25 "	"	John Mohensky (Still Birth)	" "	4905	/	/	— Top
28 "	"	Mary Borchow	Alms House	4890	✓	/	72 Top
Disinterred ~~29~~	"	by Mike Corrigan ~~Richard Ryan~~	Dec 6-1916 ~~Tuberculosis Hospital~~	~~4918~~			Disinterred ~~45 Top~~
29 "	"	John Ahern	" " " "	4918	9th Dec.	1916 106	55 Bottom
30 "	"	Louis Benard	Hoboken #135	4814	✓	/	55 Top
30 "	"	Unknown Still Birth	" " #137	4814	/	✓	—

(21)

FIGURE 4-5: Burial Register Entries for November 1916 *SOURCE: Hudson County Burial Register*

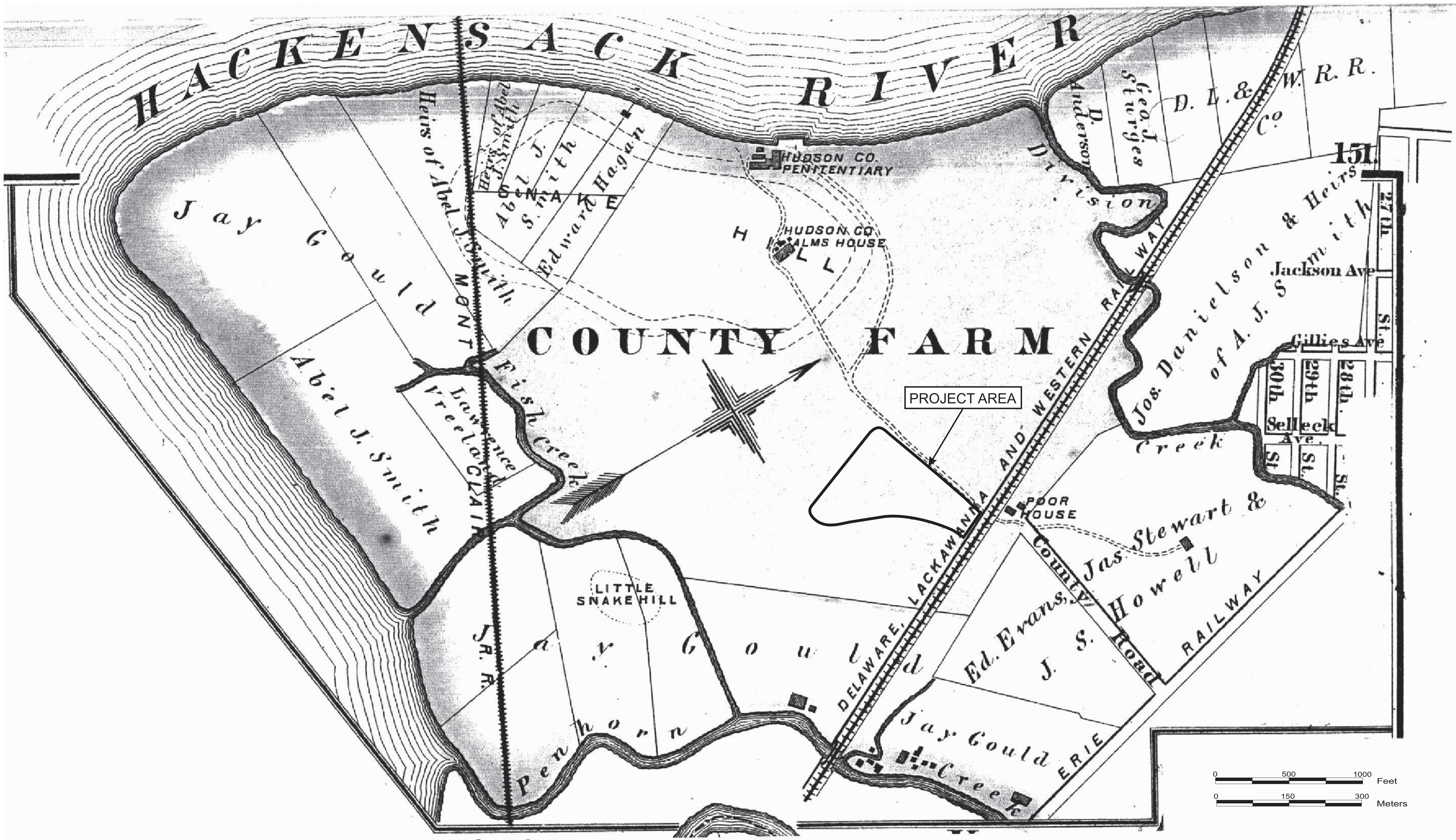


FIGURE 4-6: Project Area in Relation to County Farm, 1873

SOURCE: G.M. Hopkins

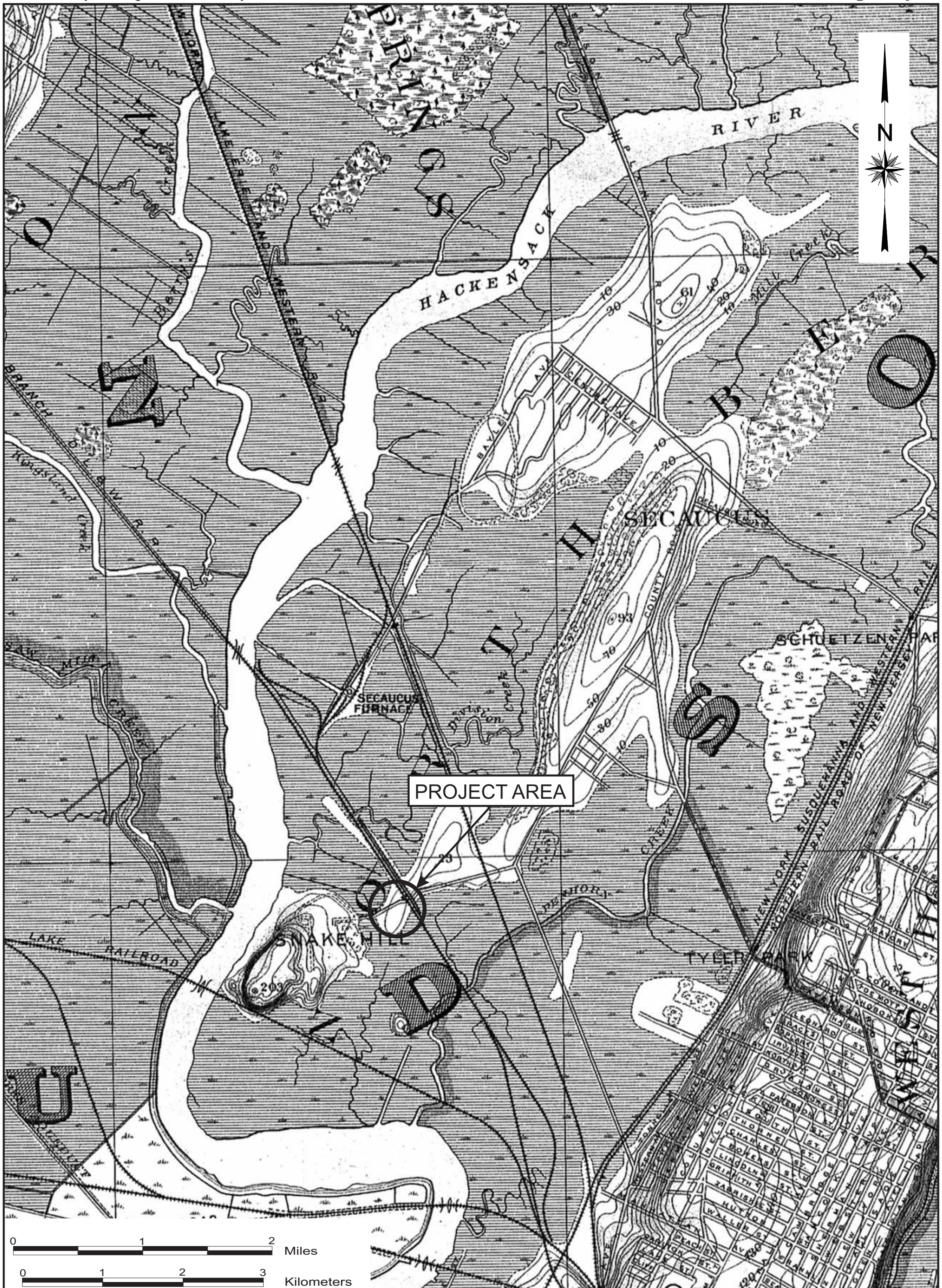


FIGURE 4-7: Overview of Project Area and Vicinity, 1890 *SOURCE: USGS, Newark to Paterson East, NJ, 1890*

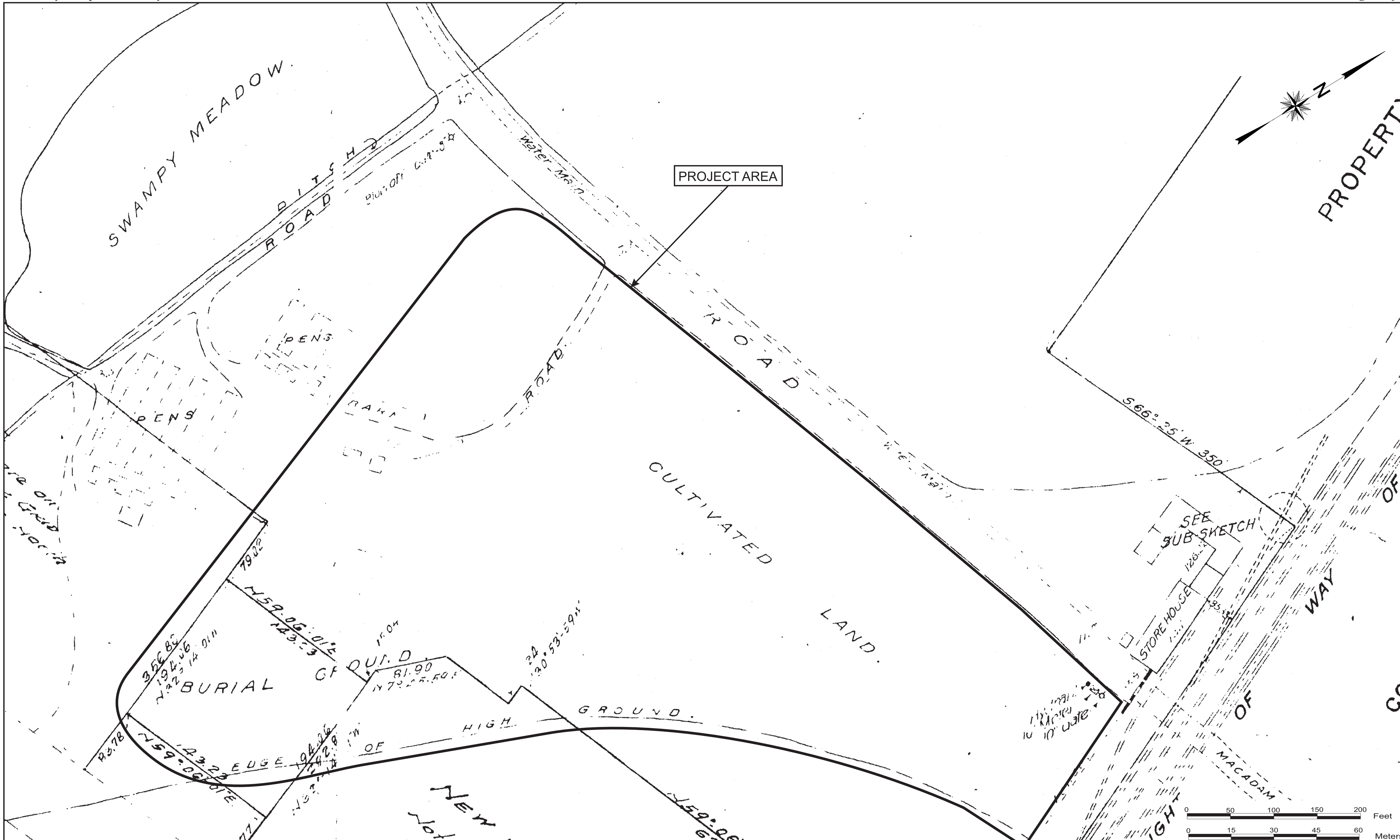


FIGURE 4-8: Eastern Portion of County Properties at Snake Hill Depicting Burial Ground (Potter's Field) and Cultivated Land, 1907

SOURCE: Hudson County Engineering Department

"Burial Ground" and "Cultivated Land" are noted. In 1949-1950 additions were made to this map to indicate the right-of-way for the proposed New Jersey Turnpike. There are, however, no clear boundaries delineated for this burial ground.

The 1923 Hopkins map of the county institutions at Laurel Hill (Mount Pinhorne or Snake Hill) (Figure 4-9) provides a detailed illustration of the "County Farm" at its peak of operation. Numerous institutional buildings are depicted along the northern edge of the then 200-foot-high prominence known as Laurel Hill, with the tuberculosis hospital and reservoir situated above (on a higher elevation) than most other buildings within the complex. Only one burial ground, noted as "Cem," is shown in the eastern periphery of the 207-acre institutional complex along a series of dirt roads. Within the Potter's Field project area one unlabeled structure is depicted along with the previously noted contour line delineating the edge of high ground (see Figure 4-8). The map does not provide any details about the function of the project area as a burial ground, agricultural farm, or other purpose.

A topographic survey of a portion of Laurel Hill completed in 1931 provides only the second definitive piece of evidence of the use of the project area as a burial ground (Figure 4-10). A small rectangular "shed" is shown at the intersection of two ash and cinder roads. One road leads from the County Road to the building, and the other westerly trending road is suspected to be the path leading back to the institutional complex. A short distance southwest of the shed is a rectangular-shaped parcel noted as "Approximate Boundary Existing Burial Ground." This survey map also depicts the contours of a narrow ridge elevated 10 to 17 feet above the "swamp" or wetlands, extending approximately 1,640 feet (500 meters) in a southwest to northeast direction. The southeastern edge of the ridge is shown sloping south to wetlands; the northwestern edge exhibits a much more gradual descent.

Two Hudson County engineering department maps, Map No. 1188, dated 1935 and revised in 1941, illustrate Potter's Field divided into 12 numbered sections of differing sizes and shapes (Figure 4-11 and 4-12). Section corners were labeled "Mont. A" through "Mont H" and "Mont J" and "Mont K." Interestingly, "Mont I" is not illustrated, and a twelfth section (Section 12) is noted but unbounded. The plan map also indicates one numbered grave board location within each section. Grave boards would have been synonymous with markers denoting the location of graves. Tables at the top of each plan sheet, labeled "Tabulation of Grave Boards," list the section number and board number for all graves and the triangulated distance from each grave to two of the monuments or section corner markers. Examination of these maps indicates that the grave board numbers are not arranged in numerical order and are rather randomly distributed throughout the sections of the burial ground. Generally, however, the numbers are lowest in the southwest and increase toward the northeast. The maps provide evidence that southwesternmost Section 1 contained the earliest interments (Grave No. 5317, dated March 1923) and Section 12, in the northeast, the most recent. The map data therefore appear to establish a physical boundary of Potter's Field at the southwestern corner of the Turnpike bridge, corresponding with the earliest of the mapped burials. The final 21 years of interments, 1941 to 1962, are not illustrated but were suspected to progress in the same general pattern, filling up space linearly to the northeast. One noted feature also represented on these plan maps is the "Cemetery Office," the overall importance of which would become instrumental to the success of the disinterment program. First, this is the earliest indication of the function of the building on historical maps as a cemetery office. Second, at the commencement of fieldwork this building was the only surviving visible vestige of the burial ground. Last and probably most important, the depiction of this feature together with its measured distances to Monuments K and F enabled the Berger team to relocate the edge of at least one section of the former burial ground.

Another map provided to Berger during the planning process was the Hudson County Engineering Map No. 769, which illustrated a burial ground section with graves numbered from 4861 to 5316 (Figure 4-13). It is undated, although an addendum noted that additions were made to the map by a survey undertaken on December 20, 1928. As discussed above, preliminary assumptions about the size and age

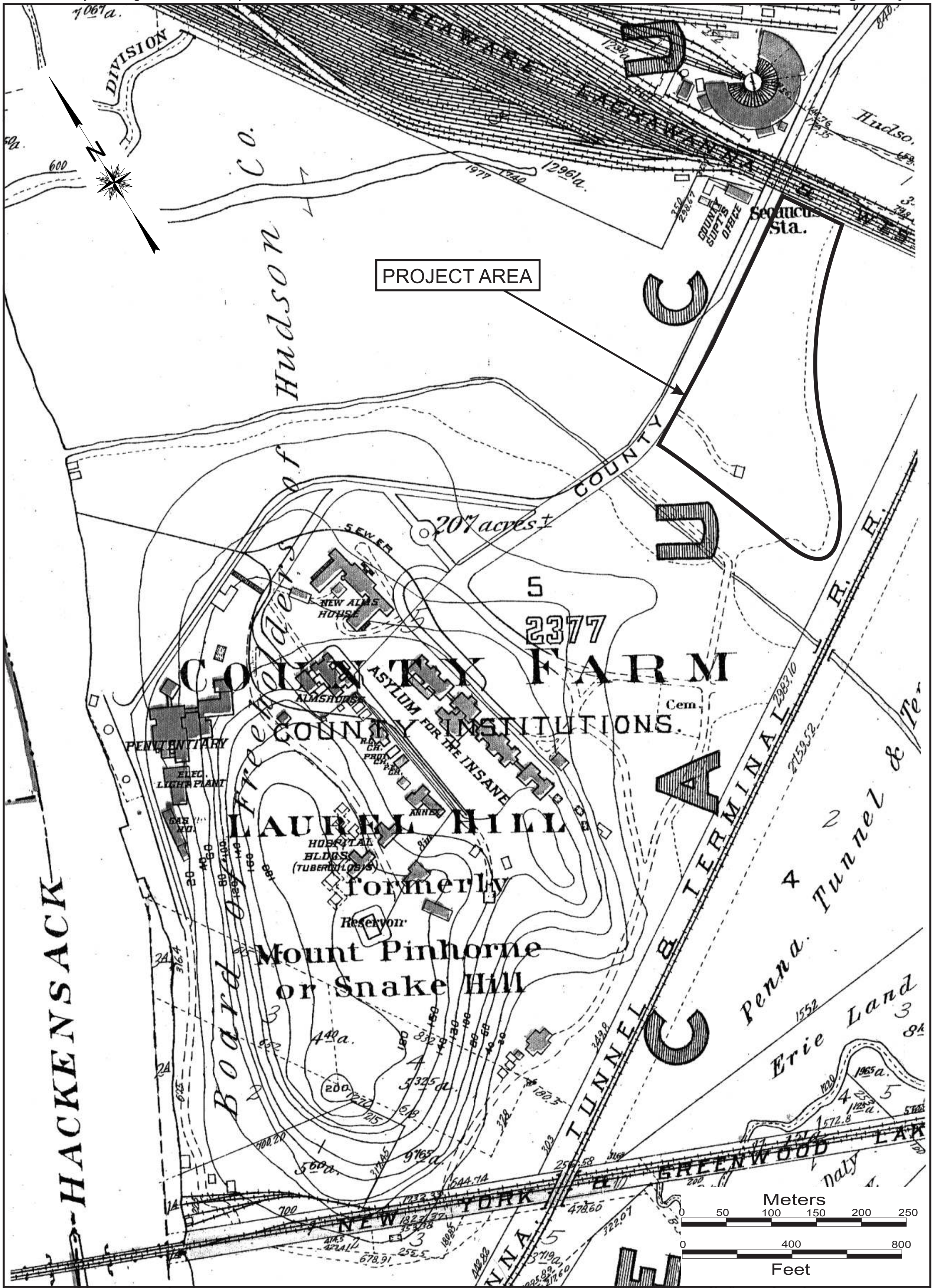


FIGURE 4-9: Project Area in Relation to County Institution at Laurel Hill (Snake Hill), 1923

SOURCE: G. M. Hopkins

FIGURE 4-10: Topographic Survey of Project Area and "Existing Burial Ground", 1931 *SOURCE: Lawlor, Baulsir & Wright*

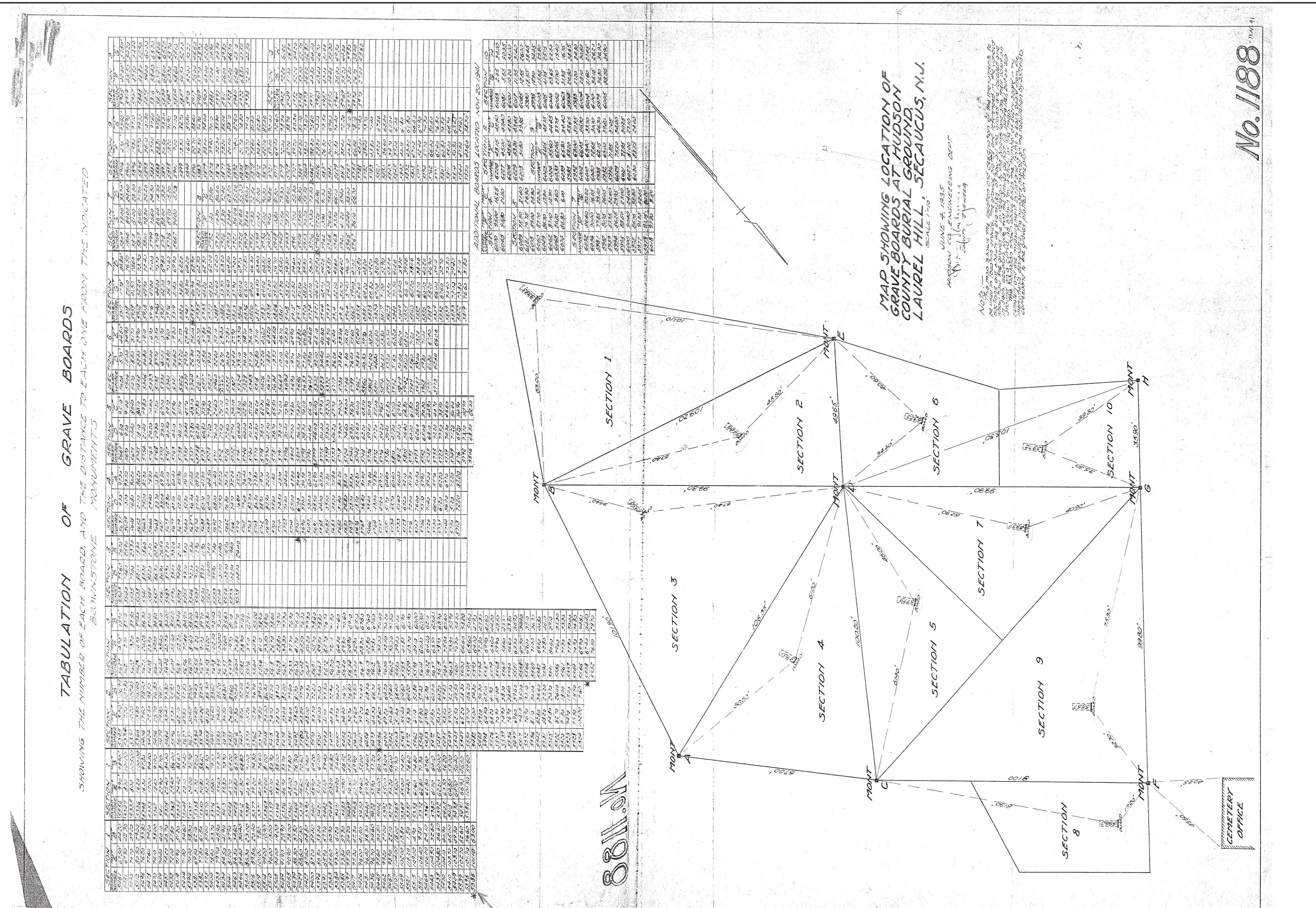


FIGURE 4-11: Map No. 1188 Showing Location of Grave Boards at Hudson County Burial Ground (Potter's Field), 1935

SOURCE: Hudson County Engineering Department

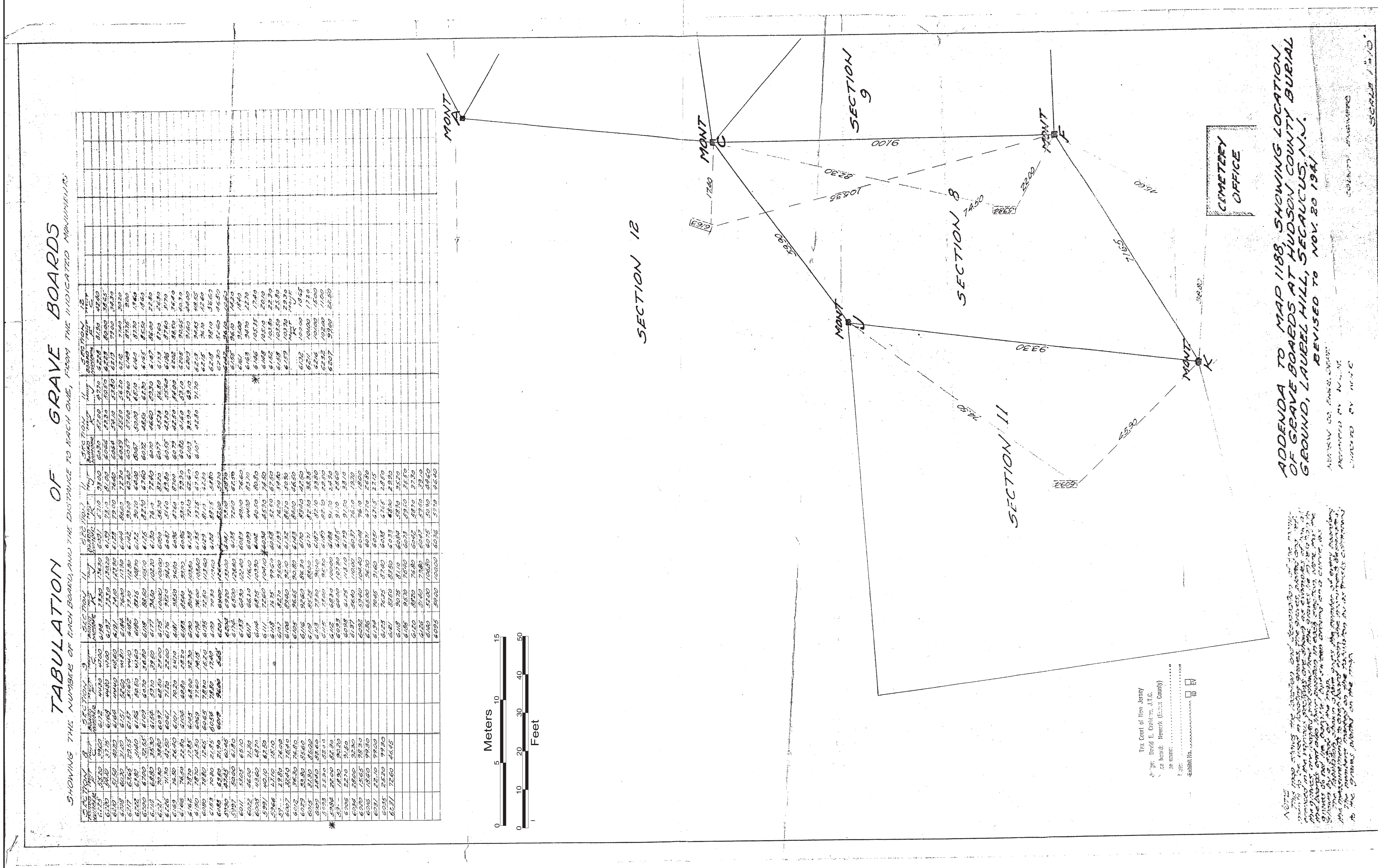


FIGURE 4-12: Addenda Map No. 1188 Showing Location of Grave Boards at Hudson County Burial Ground (Potter's Field), 1941

SOURCE: Hudson County Engineering Department

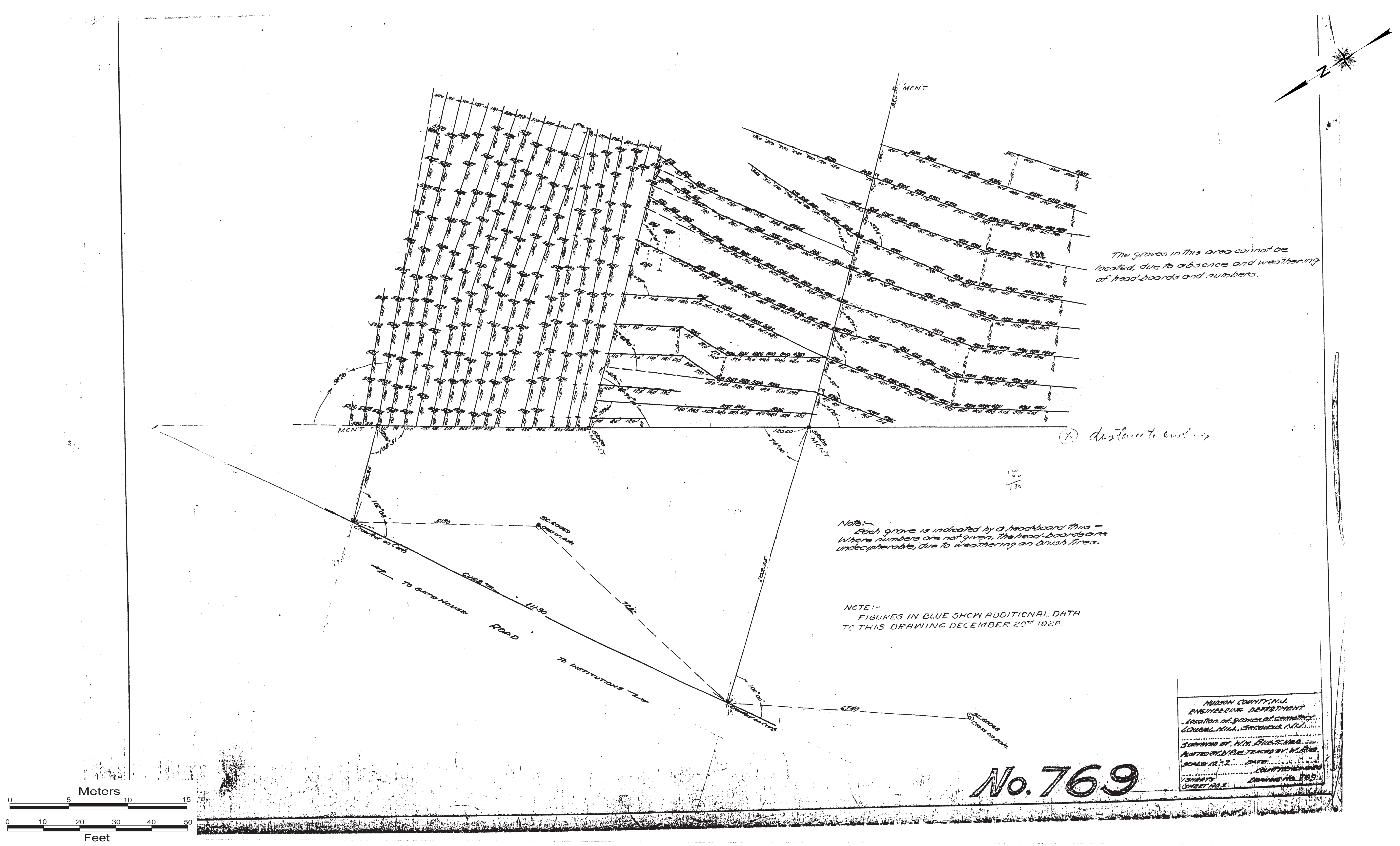


FIGURE 4-13: Map No. 769 Showing Location of Graves at Laurel Hill Cemetery (Potter's Field), Revised 1928

SOURCE: Hudson County Engineering Department

of Potter's Field led the Turnpike Authority and the Berger team to believe that the earliest interment in the project area dated to March 1923 with Burial Lot No. 5317. A consequence of this assessment was to relegate Map No. 769 to non-significant status, perhaps associated with one of the other county institutional burial grounds but not relevant to the Potter's Field project area. During the disinterment field effort this assumption was proven to be incorrect, and Map No. 769 proved to be one of the most detailed, informative, and accurate field maps for the Berger team.

The next in the series of historical maps depicting Potter's Field is the Hudson County Engineering Department Map No. 1679B, dated November 2, 1950 (Figure 4-14). The sketch plan illustrates the proposed station numbers for the construction of the New Jersey Turnpike, the configuration of the "present burial ground" as known in circa 1950, the cemetery office, and a 20x50-foot "plot designated for reburials in connection with the Turnpike's construction." Since the Turnpike Authority planned to disinter burials from under the footings of proposed piers that would support the bridge over the burial ground, they also planned on an appropriate reburial plot located about 140 feet northeast of the known limits of the burial ground in or about 1950. The Hudson County Engineering Department Map No. 1691 dated November 17, 1950 illustrates the approximate location of graves situated with the bridge pier footings (Figure 4-15). Information on Map 1691 corresponds to plotted grave locations overlaid on the Map 1188 dated 1935 (Figure 4-16). According to annotations in the Burial Register, the disinterment of graves within the proposed bridge pier footings was conducted November 21-29, 1950.

Although a diligent search was conducted in the Hudson County administration offices, state and local archives, and libraries, maps and plans focusing on the Potter's Field project area after 1950 are generally lacking. As previously mentioned, the last interment at Potter's Field occurred in 1962, after which the historic use of the site appears to have been forgotten and overlooked.

A 1982 aerial photograph provided by the Turnpike Authority illustrates the location of the bridge structure (STR E110.67) along the Turnpike and an overview of the Potter's Field project area (Figure 4-17). Just to the northwest of the bridge the aerial view shows a billboard erected adjacent to the large pond and the small cemetery office. In addition, along New County Road several trucks and trailers together with presumed small industrial/commercial facilities are represented. Overall, the project area appears sparsely vegetated with no clear indications (fence lines, delineated areas) of its former use as a burial ground.

According to available information, a detention center facility was constructed in the Potter's Field project area in the 1980s and is depicted on the Weehawken 7.5-minute USGS topographic map (1997; see Figure 1-1). This map illustrates the configuration of the two identical buildings comprising the detention center along New County Road and an unimproved road along its western periphery. There is no indication of the cemetery office or any other indicators of the former burial ground at this location.

In 1998 a land survey was performed for a portion of the Hudson County property Lot 2, Block 5 by John Zanetakos Associates, Inc. The title of the survey plan, "Proposed Lease Parcel Map," focuses on a restricted area of asphalt pavement, trailers, and fences within a secured perimeter fence line encircling a roughly 250x440-foot area along New County Road. Review and comparison of this survey with the 1999 aerial photograph indicates that the restricted area referenced by the survey plan is actually the former detention center facility. This correlation also allows for the description of buildings and landscape modifications along the road frontage of New County Road. The largest and westernmost building represented is identified as a tent on concrete pad with an adjacent propane tank and shed, to the east is a one-story prefabricated building, and further east is a one-story frame and metal building. The easternmost property depicted, closest to the railroad line, is described as a storage yard. Neither the survey plan nor the aerial photograph reveals any signs or indications of the former usage of the lot as a burial ground.

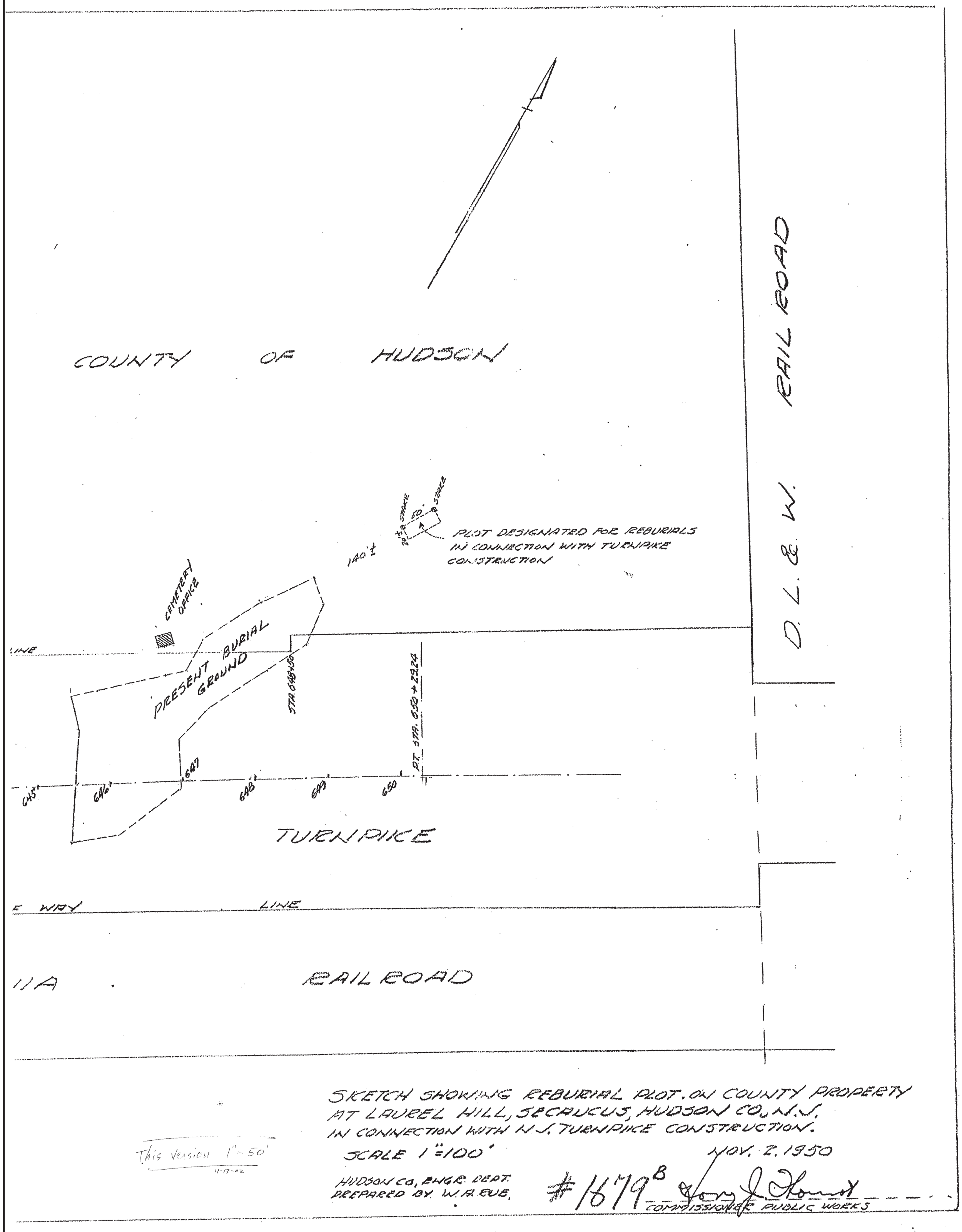


FIGURE 4-14: Map No. 1679B Showing Limits of Burial Ground in Relation to Proposed New Jersey Turnpike Right-of-Way, 1950

SOURCE: Hudson County Engineering Department

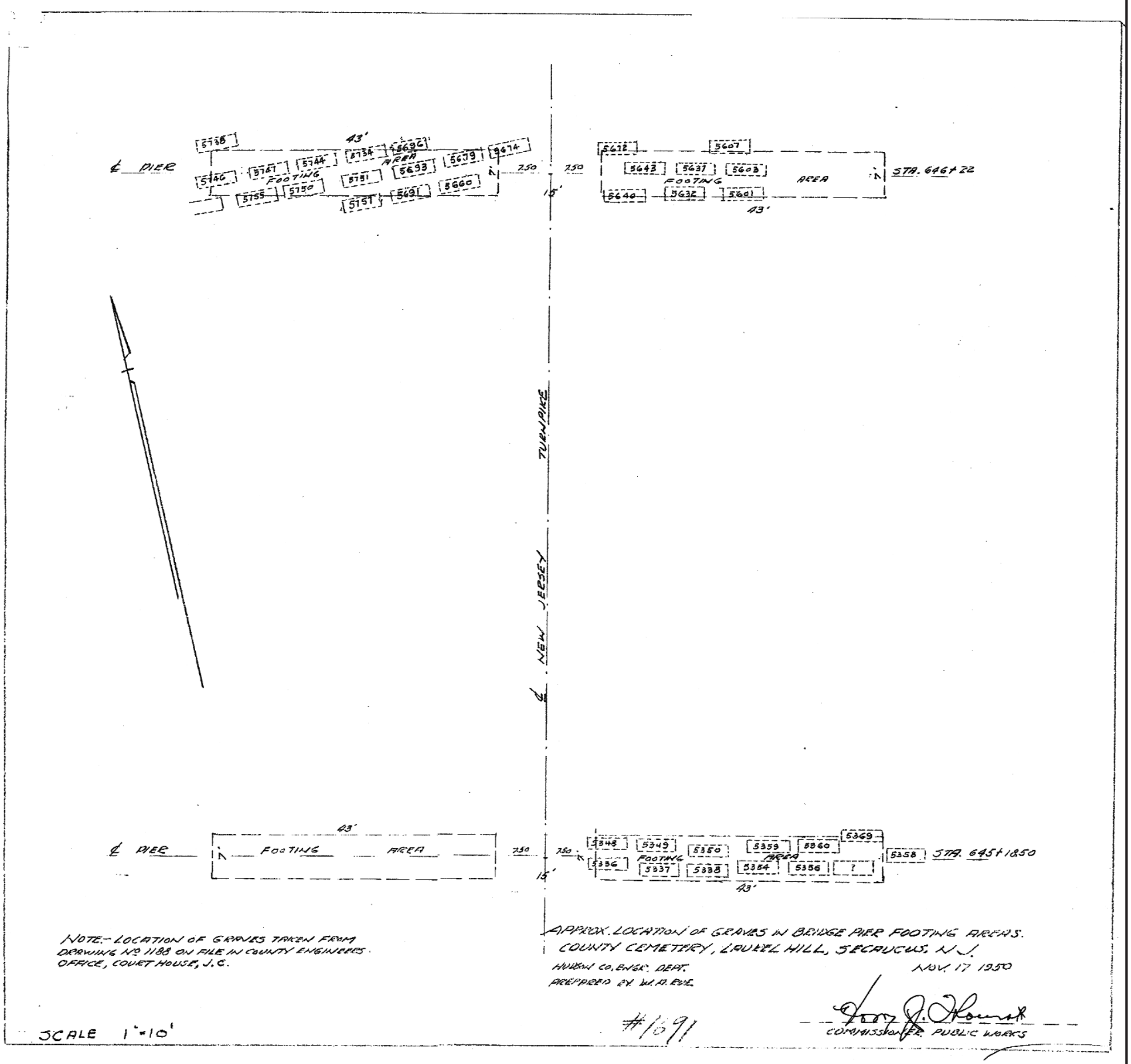


FIGURE 4-15: Map No. 1691 Showing the Approximate Location of Graves in Relation to the Proposed Bridge Pier Footings for the New Jersey Turnpike, 1950

SOURCE: *Hudson County Engineering Department; Map No. 1691*

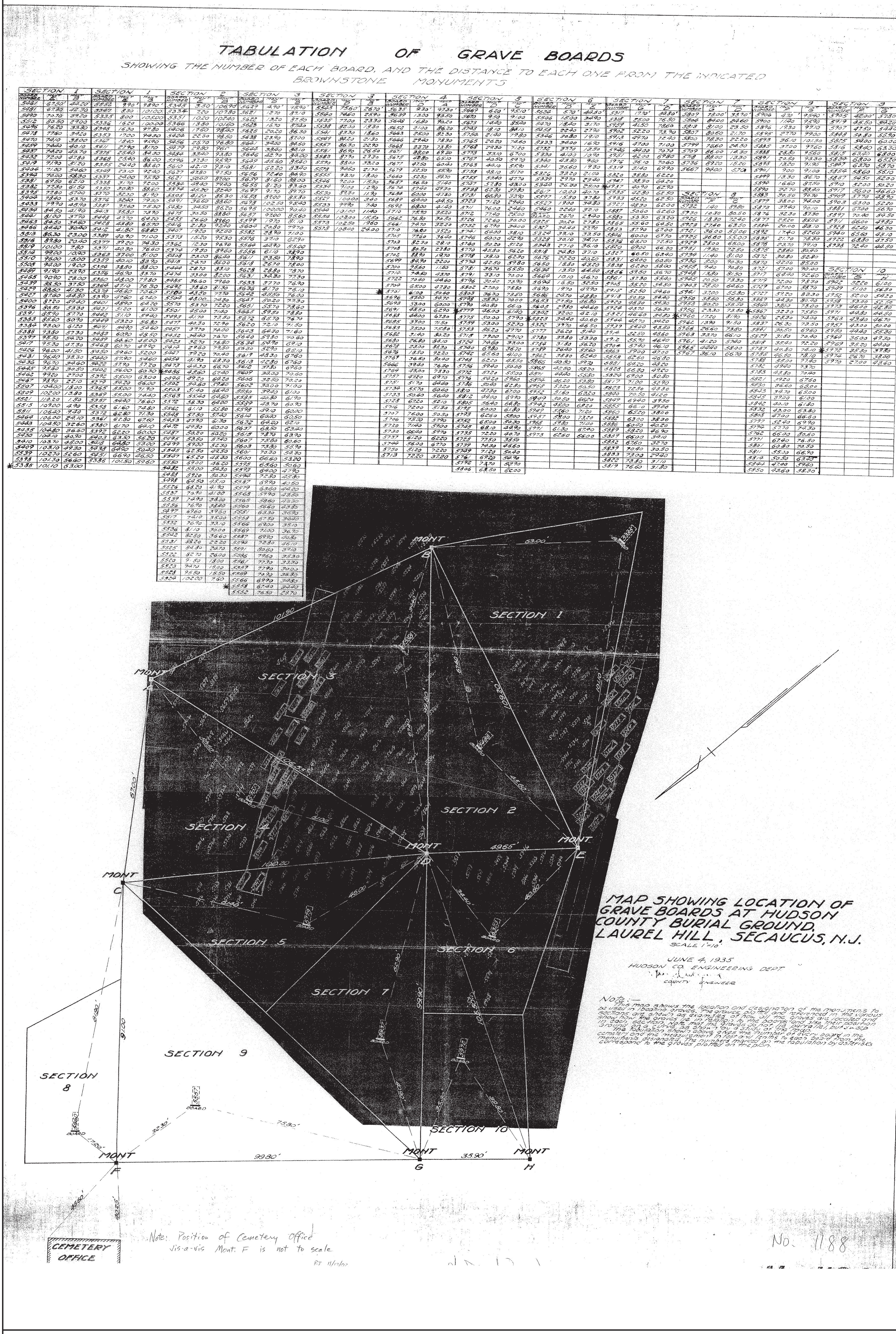


FIGURE 4-16: Plotted Grave Locations Overlaid on Map No. 1188, Overlay Circa 1950

SOURCE: Hudson County Engineering Department

FIGURE 4-17: Aerial Photograph of Project Area, 1982

SOURCE: New Jersey Turnpike Authority

CHAPTER 5. MANAGEMENT, ORGANIZATION, AND LOGISTICS

A. PRE-FIELD PLANNING AND LOGISTICS

1. Protection and Security

Early in the planning stages it was recognized that the pre-field logistics and site preparatory work would play a key role in setting the stage for the successful completion of this large and complex project. First and foremost, the project area had to be secured so that a self-contained and operational field office, on-site laboratory, temporary morgue, and staff facilities complex could be created. To secure the site from vandalism and theft, 6-foot chain link fencing was erected around the entire perimeter of the project area to restrict access (Plate 5-1). This fencing was installed using pre-cast concrete footers placed directly on the ground surface so as not to disturb any suspected or known graves. In addition, Berger's general contractor welded certain doors of the detention center closed while others had metal plates for padlocks welded into place. This restricted access to the buildings to only those key staff members who had a key to the site's pad lock system.

Second, site security also had to be considered. Access to the site was gained from New County Road using the westernmost dirt driveways associated with the former detention center. At the end of the access road was a secured, gated, chain link fence for access to the site. Berger installed appropriate and prominent signage on the access gate indicating that this was an active construction site and prohibiting trespass by unauthorized persons. Given the sensitive nature of this project, on-site nightly security guards were also employed to ensure that no harm or destruction occurred on the site, that all materials and equipment were safeguarded against theft, and, most importantly, that all open excavation areas, grave shafts, and disinterred human remains were protected.

In order to maintain the dignity of the deceased and prevent the general public from viewing the actual disinterments, opaque fencing was used in areas along the northern perimeter of the site (areas closest to New County Road) to restrict visibility into the active work area (Plate 5-2)

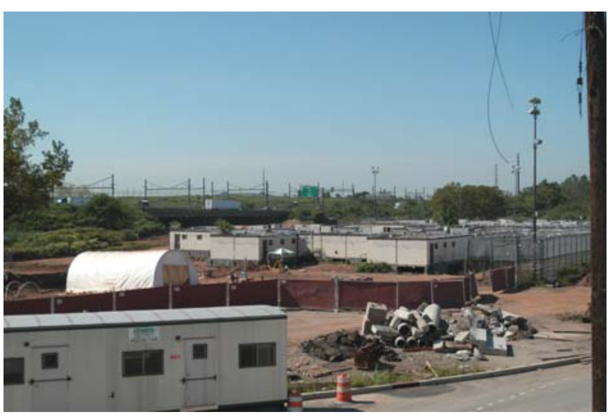


PLATE 5-1: View of Potter's Field and Detention Center

PLATE 5-2: Opaque Fencing at Potter's Field

In addition, to protect exposed grave shafts from the elements and to maintain privacy during exhumation, large durable tarpaulin shelters were erected over the grave shafts (Plates 5-3 and 5-4). Finally, because of security concerns, liability issues, and out of respect for the deceased, the public was not permitted to access the site without prior approval by the Turnpike Authority. Those individuals that were allowed access to the site were restricted from photographing any visible human remains during their visit.

PLATE 5-3: Shelters and Tarps Covering Graves

PLATE 5-4: Disinterment Shelters at Potter's Field

2. Permits

Prior to any disturbances of the ground surfaces, a Soil Erosion and Sediment Control Plan (SESC Plan), in accordance with New Jersey's Soil Erosion and Sediment Control Act (Chapter 251,@ NJSA 4:24-39 et. seq.) and consistent with the practices described in the New Jersey State Soil Conservation Committee's Standards for Soil Erosion and Sediment Control (1999), was prepared and submitted for approval by the Hudson-Essex-Passaic Soil Conservation District (HEP SCD). The Act requires certification of a SESC Plan before the initiation of most types of ground disturbing activities in excess of 5,000 square feet. The disinterment of Potter's Field was subject to this Act.

The SESC Plan, prepared by Berger's New Jersey licensed professional engineer, depicted limits of disturbance, existing and proposed contours, and other natural features. It also depicted the locations of sediment barriers and other sediment control devices.

A Disinterment-Transit Permit was also required in accordance with Title 26, Title 8A:5-20 of the New Jersey Statutes Annotated (N.J.S.A.), and Chapter 5 of the New Jersey State Sanitary Code governing disinterment, reinterment, and cremation. The permit was completed by the project's funeral director and executed by the Turnpike Authority, supervising funeral director, receiving cemetery representative, and the authorized State Health Official. Typically, one permit is completed for each set of human remains disinterred; however, since it was originally presumed that Potter's Field contained the remains of approximately 3,500 individuals, it was agreed that a single permit would cover the entire disinterment/reinterment process. As such, one permit was completed for 3,500 sets of unidentified human remains. Unexpectedly, a second permit had to be completed for the 1,071 additional sets of unidentified human remains recovered from Potter's Field. Finally, two additional Disinterment-Transit Permits were completed for the transfer of two sets of human remains reclaimed by living lineal descendents and approved by the Court. In sum, a total of four permits were completed for the disinterment and reinterment of human remains from Potter's Field.

3. Health and Safety

In accordance with the federal regulations administered by the Occupational Health and Safety Administration (OSHA) (29 CFR 1910.120[b][4]; 29 CFR 1926.65[b][4]), a site-specific health and safety plan (HASP) was required. The HASP identified, evaluated, and provided procedures to control safety and health hazards suspected at the Potter's Field site.

Development of the HASP required site characterization and analysis of the project area, including the review of historical and other background information about the area, field inspection by the Project Health and Safety Coordinator and other key staff members, and the collection and examination or analysis of soil and other samples. The HASP assessed the health and safety hazards that workers and visitors to the site might encounter, taking into account both conditions at the site and the nature of the tasks and activities that would take place. Based upon the risk assessment, the HASP identified appropriate personal protective equipment (PPE), work procedures, and administrative and engineering controls to be employed in order to minimize exposure to known or suspected hazards. In addition, the HASP addressed certain other matters, such as the project administrative structure with respect to safety, worker training, soil and air monitoring, medical surveillance, and on-site visitor protocols.

A preliminary inspection of the site and review of its history indicated that the HASP address the following hazards as being of specific concern at the Potter's Field site:

- General operations safety;
- Worker safety around backhoe and other mechanized equipment;
- Open excavations safety;
- Falling objects (stones, etc., from overhead highway);
- Manual lifting (soil, boxes, etc.);
- Soil-borne hazards;
- Chemical contaminants, possibly including lead (from auto emissions and old paint on underside of overpass decking);
- Arsenic (from early twentieth-century embalming materials) and toxic organic compounds (breakdown products from formaldehyde or other embalming materials);
- Disease-causing micro-organisms associated with the human remains at the site that (1) in a suitable environment could still be viable, including anthrax and tetanus, which are spore-forming, and smallpox, polio, hepatitis, meningitis, and tuberculosis, each of which is associated with persons interred in the three Hudson County Institutional Burial Grounds as indicated by entries in the burial registers; or (2) that could remain viable for extended periods of time under suitable environmental conditions; and
- Psychological stress arising from working in a burial ground with large numbers of human remains, coffins, personal effects, etc.

The HASP also addressed other types of health and safety hazards of a more routine nature, including:

- Inclement weather (cold, wet, etc.);
- General biological hazards (animals and plants);
- Water, marshes, and bogs;
- Noise;
- Motor vehicle operation; and
- Electrical.

Based upon the completion of the risk assessment, it was determined that the minimum level of precautions specified by the so-called universal precautions for bioarchaeologists would be adhered to during the disinterment project. Minimum level protection or Level D personal protection equipment included dedicated work clothes, PVC coated Tyvek (based upon task), steel-toed and steel-shanked work boots, disposable outer boots (optional), hard-hats, safety glasses or goggles, nitrile/latex inner gloves (based upon task), neoprene outer gloves with optional cotton liner, work gloves, and earplugs (as required by task). The Site Specific HASP also outlined procedures and protection for Level C and Level B PPE. Level C PPE was available on-site in the event that chemical splashes or atmospheric concentrations of contaminants warranted full-face air-purifying respirators and coveralls. Fortunately, neither Level C nor Level B PPE was required or implemented during the disinterment fieldwork.

4. Utilities

Given the complex nature of the project, the expected duration, and the season of fieldwork together with the need for on-site amenities, water, electric, and telephone service had to be established at the Potter's Field site. Though the site had formerly been used as a detention facility, all of the utility service lines, boxes, and meters had been disconnected and removed. Therefore, new lines of service had to be established for the site by tapping into the established service lines available along New County Road. Each utility service company was contacted, a request for new service was filed, and coordination/scheduling for the utility hook-ups was established.

Water service was established through the installation of a new 3.0-inch PVC pipe extending from the water main located at the edge of New County Road to a corner of the detention building. The water line system within the former detention building was then tested and retrofitted to suit the needs of Berger's team. Several of the former hot water heaters were replaced with new hot water tanks that serviced several bathroom sinks within the former detention building. An extension to the water line was then established from the detention building to the Health and Safety trailer that was outfitted with several showers, lavatories, and a sink. As such, members of the field team were able to bathe, cleanse their hands and faces, and rinse or hose down various field and laboratory tools.

Electricity was needed to power lights, computers, office equipment, heaters, fans, air conditioners, small kitchen appliances, and to recharge batteries for various pieces of field equipment (cameras, monitoring devices, total station, etc). Berger utilized the services of a New Jersey-licensed electrician to re-wire the detention building and establish power boxes at various locations across the site so that floodlights and fans could be utilized during exhumation under the shelters. In order to re-energize the site, Public Service Electric & Gas (PSE&G) installed a new transformer on an existing pole situated immediately adjacent to the site and strung an electrical line to a newly established power box and meter located on the rear of the detention building. Berger's electrician then powered up several electrical boxes within the detention building and checked the circuitry to allow for the use of certain lights and outlets. In addition, several power boxes were established for field use: one box was affixed to the former cemetery office and others in areas too far away from the detention building to run an extension cord.

Electrical service and a telephone line were also provided to the on-site office trailer for general office equipment, such as computers and facsimile machines, and for recharging of equipment batteries. Aside from establishing landline-based telephone service, each member of the key staff was assigned a mobile phone to ensure prompt and effective communication. This was especially important in cases of emergencies in the field, given the size of the project area and the inability to guarantee free airtime on the handheld walkie-talkies owing to channel use by the various general contractors in the Secaucus area.

Portable gas-powered generators were also utilized throughout the duration of the project to supply additional power for heaters, fans, lights, pumps, and small equipment. On the evening of Thursday, August 14, 2003, when the "lights in the Northeast went dark" because of a severe power outage, the Potter's Field team converted to generator power to carry on project duties and responsibilities.

5. Obstruction Removal/Site Cleanup

Prior to and during fieldwork, vegetation and other above ground obstructions within the site limits had to be removed to ensure safe and effective operations. The first task was to clear the site of trees, bushes, and shrubs (Plate 5-5 and 5-6).

PLATE 5-5: Overgrown Vegetation at Potter's Field

PLATE 5-6: Vegetation Surrounding Cemetery Office

In general, vegetation was not grubbed but rather cut (leaving the stump in place), collected, and then either stockpiled or chipped on-site (Plate 5-7). Large tree limbs were placed in a pile along the access driveway outside the suspected limits of the burial ground and therefore out of the way of field operations. The wood chips from the vegetation removal were placed in the foundation of the former cemetery office, which was also out of the way of field operations. As exhumations proceeded, tree stumps were carefully extracted from the ground and then carted to the pile established along the access drive for later disposal off-site.

PLATE 5-7: Tree Clearing and Vegetation Removal at Potter's Field

Berger's general contractor was tasked with the responsibility of dismantling portions of the existing 16-foot-high, double-encompassing, concrete-founded security fencing encircling the detention center (Plate 5-8). Disassembling this security fencing required the use of an oxy-acetylene cutting torch to cut the fence from the post and the post from the foundation. A trackhoe was then used to pull the fencing down and then crush it into manageable loads. For poles and pipes projecting up or lying on the ground surface, a powered metal cutting saw was used. Having been abandoned for some length of time, the site had obviously been an attraction for scavengers looking for spare parts, fittings, and the like, and numerous nails, screws, clamps, and wire were strewn across the paved areas and within the buildings (Plate 5-9).

To prevent damage to the rubber tired machinery, staff vehicles, and personnel, a large industrial magnet and surface collection was conducted to gather and dispose of these potential hazards.


PLATE 5-8: Security Fence Around Detention Center


PLATE 5-9: Abandoned Detention Center

Razor wire was another potential hazard that necessitated careful handling and storage. Disassembly of the razor wire along the edges of the roof and atop the security perimeter fencing was typically conducted after crew working hours or when site personnel were in other areas of the site. Razor wire was stockpiled within the site limits but in unused areas surrounded by fencing to prevent harm or injury to any personnel.

Other on-site obstructions that precluded the identification of grave shafts included macadam, gravel, and concrete. The "yard" area of the former detention center was covered with macadam for use as a basketball court and general recreation area (Plate 5-10). Examination of the burial ground maps indicated that the macadam overlaid portions of the interment space. Therefore, a trackhoe equipped with a claw was used to break up pieces of the macadam and allow the rubber-tired backhoe to gather and containerize the pieces for later off-site disposal. Gravel was discovered as a sub-base to the macadam and in the rear "yard" areas of the former detention center. In general, gravel was scooped up by the front-end loader and stockpiled by the general contractor for re-use during the disinterment program. Gravel was essential for creating dry interior site paths during rain and snow melt, and for solid/stable footings for excavation machinery when working in wet and muddy settings across the site. Finally, concrete, both as reinforced slabs and footers to stanchions, posts, and signs, required the use of the trackhoe's claw for extraction. Once extracted the pieces were placed on the front-end loader and carted to the debris pile area situated along the site's access roadway.

6. Utilization and Retrofitting of Detention Center

During the initial inspection of the project site in November 2002, the most obvious and permanent features were the detention center buildings. Though cold, dark, impersonal, and largely barren, except for some tables, stools, and bunk bed frames bolted to the floors, the buildings' wings and former central dining areas were envisioned as the on-site laboratory, equipment storage, temporary morgue, and staff cafeteria and locker rooms (Plate 5-11).

The former detention center complex actually consisted of two identically configured buildings. Each building was composed of five wings connected to the central dining area by short hallways. The overall square footage of each building was 9,967 square feet, or about 20,000 total square feet of re-useable enclosed and secured space for the disinterment program (Figure 5-1).

PLATE 5-10: Recreational Yard Area of Detention Center Covered With Macadam

PLATE 5-11: General View of Abandoned Detention Center Building

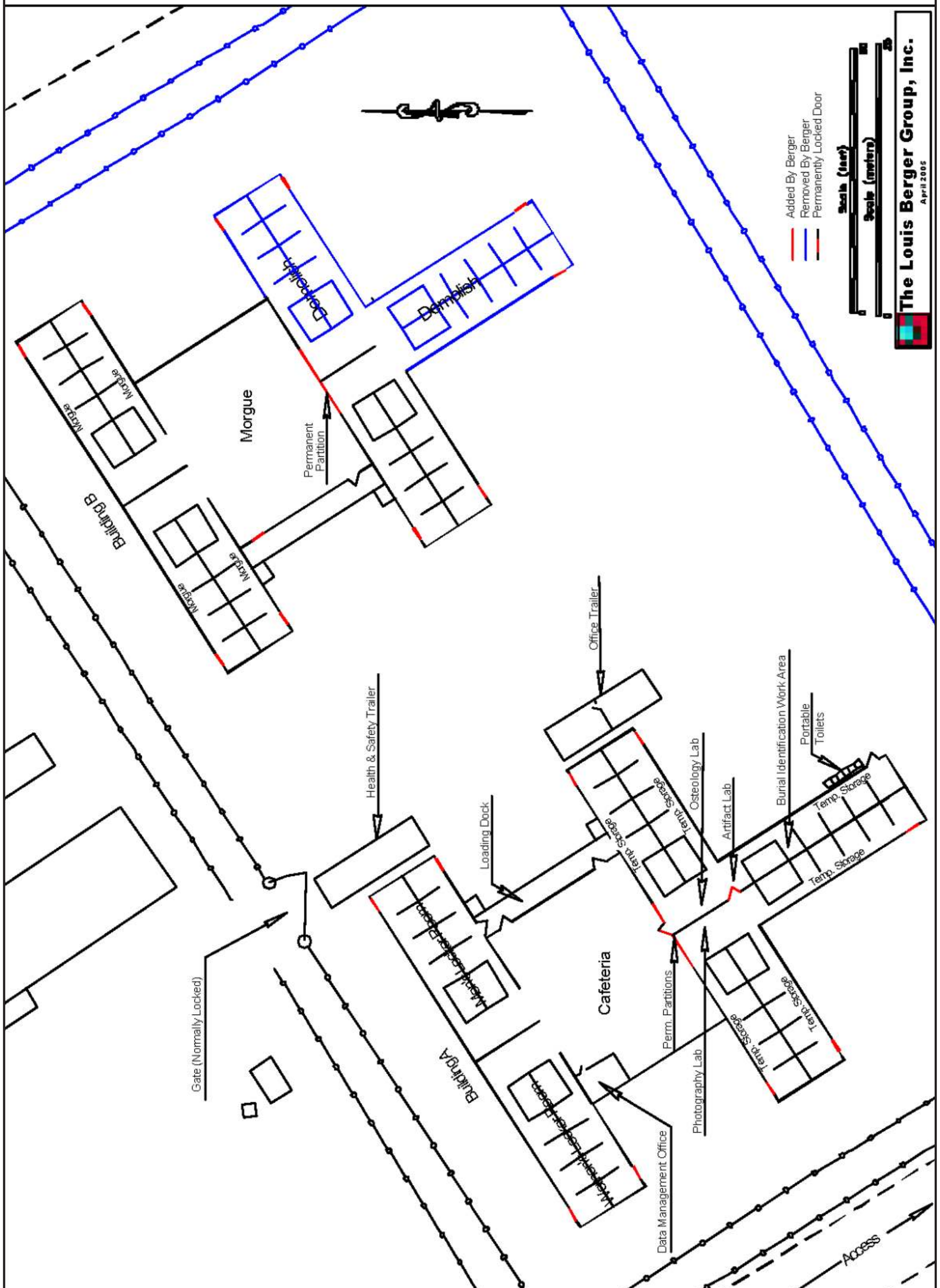


FIGURE 5-1: Retrofitting of Detention Center

The building closest to the access road and gate, the westernmost building, was designated Building A and retrofitted to accommodate the field container check-in area, laboratory and analytical area, photography studio, visitor exhibit table, equipment storage area (consisting of 950 square feet), interim storage area for disinterred remains and artifacts (3,718 square feet), men's and women's locker rooms (2,310 square feet), data management office (425 square feet), and on-site cafeteria (2,561 square feet) (Plates 5-12 thru 5-15).

PLATE 5-12: Equipment Storage

PLATE 5-13: Staff Locker Rooms

PLATE 5-14: On-Site Cafeteria

PLATE 5-15: Laboratory and Analytical Area

To enable improved passage throughout the building, the general contractor cut several doorways through the ¼-inch-thick steel walls using oxy-acetylene cutting torches. Then all the bunk bed frames were gathered from Buildings A and B and placed in the former sleeping cubicles in the southernmost dormitory wings of Building A. In general, two sets of bunk bed frames, one on top of another, fit into each area, providing organized shelf storage for field containers awaiting analysis and photography (Plate 5-16). Next, all the stainless steel tables from the dining area in Building B were collected and moved into the hallways of Building A to serve as analytical tables and photo-studio tables. This was followed by the installation of hooks in the former sleeping cubicles on the opposite side (northernmost portion) of the Building A. Each field team member was provided a hook, container, and floor space for the storage of various field clothing, boots, and hats to accommodate changing weather conditions on the site. In addition, the former dining area was sterilized and reorganized for use as the general first aid station, communal water and fluids area, break/lunch room, and kitchen area equipped with coffee makers, microwaves, and a refrigerator. The staff brought potable water for drinking and cooking to the site daily.
Having moved all the bunk bed frames and tables to Building A, Building B was empty. The southern half of Building B was believed to overly grave shafts and therefore it would be demolished as part of the disinterment program. The northern half of Building B, including its former dining area and two wings (about 5,711 square feet of storage), was converted into storage space, or temporary morgue, for field containers until the reinterment program could begin. As this portion of the building could expect to hold

as many as 3,500 sets of human remains and the field team would have to be able to retrieve any specific box at any given moment, organization of the space was critical. A system of pallets were constructed and laid out around the room and down the hallways and wings. The burial inventory number series (e.g., 100's, 200's, etc.) was spray painted on the floor in front of the pallets for ease in locating a specific series of containers (Plate 5-17).


PLATE 5-16: Bunk Bed Frame and Cubicle Storage


PLATE 5-17: On-Site Temporary Morgue

7. Weather Conditions

Initially, the Turnpike Authority anticipated that the disinterment program would require a six-month field effort starting in November 2002 and ending in May 2003. However, since the Final Court Order authorizing the disinterment was not issued until January 2003, the start of fieldwork was delayed until February 2003. Knowing that the field operations would be initiated in the winter and likely continue through the spring into early summer, Berger prepared for the worst case scenario for every season.

Typical winter conditions that might be expected included frozen ground, snow, and cold air temperatures. Therefore, heated shelters over the excavations were used to keep the field teams warm, assist in ground thawing, and prevent the accumulation of snow over the grave shafts. Two large shelters (20x36x12 feet) and two smaller shelters (14x24x14 feet) were acquired for use at Potter's Field. As is common practice for archaeological excavations in cold weather, portable propane heaters were utilized to maintain a comfortable working environment. Portable heaters were also needed within the detention center buildings since the existing heating system could not be restarted.

The preparations for spring weather conditions included the anticipated use of tarps and small pumps to keep excavation areas as dry as possible. It was also expected that portable fans would be needed in the spring and summer months to keep fresh air circulating through the excavation shelters and detention center buildings.

B. SITE MANAGEMENT

1. Excavated Soils

Interpretation of the Final Court Order indicated that no soils excavated from Potter's Field could be carted off-site. Based on the results of fieldwork, approximately 33,640 cubic yards (25,720 cubic meters) of overburden had to be removed from the surface of a 4.2-acre project area in the search for and identification of graves. In compliance with the Final Court Order, Berger transported excavated soils by a front-end loader and dump truck to stockpile areas determined, at the beginning of the disinterment program, to be non-utilized interment areas within the project area. During the course of the field effort, however, Berger's discovery of burials outside the previously mapped limits of the burial ground guided the excavations into areas initially used for stockpiling spoils. Expansion of the excavation areas required frequent and time-consuming relocation of spoil piles to the extent that all excavated soils were moved at least twice during the course of the disinterment program.

2. Groundwater

The standard excavation practices employed for exhumation were, to a large degree, dependent on environmental conditions affected by hydrology and weather. The location of Potter's Field, though selected in part for its relatively dry ground near the former county institutions at Snake Hill, is, nevertheless, situated in a major tidally influenced freshwater wetlands. Tidal and meteorological influences cause the water table to oscillate vertically. Further, construction of the Pennsylvania, New Jersey and New York Railroad track bed in circa 1900 and the New Jersey Turnpike in 1950 have restricted groundwater flow in ways that appear to have accentuated localized ponding. The overall result is a variable, high water table within the Potter's Field project area.

The primary consequence of the high water table was the accumulation of water in graves. Despite round-the-clock pumping to remove water from burial recovery locations in Potter's Field, many burials remained partially or entirely below the water table during documentation and disinterment efforts (Plates 5-18 thru 5-21).

PLATES 5-18: Localized Ponding and High Water Table at Potter's Field

Typically, if mechanized pumping failed to lower the water level in an on-going investigation of a grave, the exhumation team would attempt to bale the water by hand, removing enough to expose the skeletal remains, followed by rapid documentation and removal of all burial elements. Deep burials and those located closest to the wetlands were often completely inundated, and in these exhumations workers had to forsake the meticulous excavation practices that exposed burials for photographic documentation. Skeletal remains, artifacts, and coffin wood from burials located at or below the water table were recovered, by feel, from essentially hidden contexts, limiting the quantity and quality of information acquired.

PLATES 5-19: Accumulation of Water in Graves

PLATE 5-20: Hand Pumping

PLATE 5-21: Muddy Graves

The hydrologic cycle played a major role in the preservation of human skeletal remains, coffin wood, and other materials, such as leather, metal, and cloth. Burials were encountered in three different soil/hydrological conditions (i.e., degree of water saturation). The lowest layer tended to be perpetually wet, creating an anaerobic environment in which wood, bone, and other organic materials were well-preserved. Metal artifacts in this zone were poorly preserved, particularly ferrous and cuprous items. Because of the tidal nature of the Meadowlands, a middle hydrologic layer was formed that was subject to cyclically wet conditions, leading to considerable levels of organic decay. Most of the burials judged to be indeterminate for gender and age were recovered from this zone. The upper hydrologic layer consisted of well-drained soils and was largely a dry zone with good to excellent bone preservation. Coffin wood tended to decay rapidly in this upper layer.

3. Weather

Although the team had planned for a variety of weather conditions, the unusually adverse weather conditions actually encountered during the nine months of fieldwork required an almost constant site management plan. From February to October 2003 the project area was subjected to some of the worst weather conditions in more than a decade. Subzero wind chills and heavy snows were recorded at the site during the winter, while the spring witnessed heavier than normal rainfall and the summer brought heat indexes over 100 degrees.

As the second week of fieldwork commenced, the President's Day Blizzard of 2003 (February 16-18, 2003) pounded the Potter's Field site with 30-mph winds, heavy, blowing snow that reduced visibility and ultimately covered the site with almost 2 feet of snow (Plate 5-22). Although the backhoe and heavy equipment cleared paths within the site, access roads into the site from Secaucus were not passable. The main road (New County Road) and the access driveway down to the site were under the jurisdiction of the County DPW and other contractors; therefore, the Berger team was reliant upon the efforts of others to clear the roadways prior to continuing work. In addition, the Project Manager and Health & Safety Officer (HASO) agreed that without a clear and viable passage into and out of the site, together with the blowing and drifting snow that was severely restricting visibility, worker safety could be jeopardized. As such, the anxious team of archaeologists sat idle for one and a half days.

Snow and cold temperatures continued into March with a slight taste of spring arriving by late March 2003. Hoping that the frozen ground and cold temperatures had been left behind, disinterment activities continued when in April yet another unusual weather system belted Potter's Field. During the first week of April an unusually warm air mass developed in the central Plains and began moving east, when it was joined by a cold front coming out of Canada. As this large, slow-moving weather front spread eastward, it dropped cold rain and wet snow along the East Coast. On April 7th the ground surface at Potter's Field was covered by 6 inches of snow (Plate 5-23). So as not to adversely effect the project schedule and enable the crew to continue working throughout the day, the equipment operators were tasked with the responsibility of clearing footpaths across the site for the field crew as well as plowing the entrance roadway in order to maintain egress in and out of the site.

PLATE 5-22: February 2003 Blizzard at Potter's Field

PLATE 5-23: April 2003 Blizzard at Potter's Field

Four days later, on April 11, 2003, heavy rains fell across the site and a new site management concern began to develop: excess surface water. Surface water control and management at Potter's Field was a daily concern from April through June and even into September. The records from the Harmon Cove Weather Station in Secaucus indicate that more than 6.6 inches of rain fell in June 2003, with nearly 3 inches on June 4 alone, almost 4 inches in August 2003, and over 8 inches in September. Steady and/or significant amounts of rainfall on Potter's Field presented an ongoing struggle for both field technicians and heavy equipment operators. Since the site was surrounded by wetlands, tidal drainages, and a pond, with the outflow for the pond traversing directly through a portion of the site, a significant portion of the general contractor's time was applied to the installation of filtration/sediment bags, emplacement of conduits, re-trenching/dredging of channels, and general water pumping operations. As the pond's outflow had a tendency to back up, trees and debris clogging the outflow had to be cleared. In addition, the outflow pipe situated in close proximity to New County Road was discovered to be crushed and restricting the drainage of the pond's outflow. This situation was rectified using a backhoe and laborers to re-established the channel and pipe. In other areas of the site, filtration/sediment bags had to be established to drain areas where the field technicians were exhuming remains, and to re-configure pathways over the pond's outflow channel once human remains were found within the channels banks. The management and control of surface water also included the constant grading and regrading of the site's soils so as to avoid excessive ponding. Moreover, for days following a period of heavy or steady rain, pumps were established at selected locations across the site and set to run on 24-hour cycles. Despite all these efforts, it was customary for the field technicians to have individual hand-pumps and buckets so that individual grave shafts could be properly drained and examined as they were being excavated.

As if this were not enough, the National Weather Service predicted that Hurricane Isabel would make landfall on the East Coast and produce hurricane or tropical storm conditions in New Jersey on September 18 and 19, 2003. All necessary safeguards to buildings, equipment, and tools were therefore taken and plans for power outages secured before the storm hit. Some of the precautionary measures included sandbagging and anchoring of the protective shelters; disassembling the side tarps of shelters; stockpiling all screens, tools, buckets, etc.; purchasing sufficient fuel to allow operation of all available generators in the event of power outrages; amassing quantities of water and food supplies for the staff; and general site clean-up and lock-down.

Despite all these unusual weather events and conditions, the Berger team forged ahead, losing only one and a half days of work over the total 186 field days. In general, "neither snow nor rain nor wind" kept the Berger team from their solemn responsibilities at Potter's Field.

4. Debris Piles

Preparation, stripping, and excavating of the 4.2-acre Potter's Field site necessitated numerous clearing and demolition tasks that resulted in the accumulation of tons of debris. In accordance with the guidelines for disposal of construction and other related debris, each material type had to be sorted and arrangements had to be made to have specific items hauled off-site by private vendors.

Although tree limbs and brush were chipped and retained on-site for use in filling potholes and providing dry pathways for staff, the numerous large tree stumps had to be stockpiled on-site for later disposal. As the stripping and grading progressed, a mound of tree stumps began to accumulate along the access driveway. The area west of the access drive was also used for the stockpiling of collected rubber tires extracted from the soil and fill deposits discovered throughout the site. Tires from heavy equipment, trucks, and cars, some still affixed to their rims, were a constant reminder of the site's transformed function since its abandonment (Plate 5-24).

Excavations also uncovered concrete slabs, some reinforced with rebar, and the concrete foundation footers for the former billboards that once overshadowed the adjoining Turnpike. In addition, demolition of the former caretaker's cottage for Potter's Field generated a large pile of red brick. Many of these bricks were collected for reuse in the reinterment cemetery and the remainder were containerized for disposal off-site (Plate 5-25).

The careful disassembly of the double-encompassing chain link security fence around the former detention center complex presented yet another stockpiling and disposal concern. The fencing and razor wire were demolished and moved during off-hours (when the staff was not on-site) as a precaution and were specially handled and piled on a corner of the asphalt, encircled by temporary fencing and caution tape.

The removal of asphalt pavement and miscellaneous wood resulted in the disposal of 10 containers of asphalt and/or wood from the site. Finally, the demolition of two wings of the detention center that were found to overlie interments resulted in an additional 106,320 pounds, or 53 tons, of scrap metal that required disposal (Plates 5-26 and 5-27).

Overall, the diversity and quantity of unexpected debris collected from the site necessitated a revision to the site management plan and organization of the team. In particular, the general contractor provided additional heavy equipment (i.e., backhoes and dump truck) together with additional laborers to efficiently handle and move discovered debris materials away from the areas of active stripping and disinterment. As such, progress of the stripping and disinterment activities was not hampered in their progress and the sub-team of debris/soil handlers was employed to maintain overall order and maintenance of the site.

PLATE 5-24: Tires

PLATE 5-25: Brick and Wood from Cemetery Office

PLATE 5-26: Debris from Detention Center

PLATE 5-27: Asphalt and Scrap Metal Debris

C. PROJECT ADMINISTRATION

1. Organization

Initially, Berger recognized that the ultimate success of this large, complex, multi-task project was contingent upon the ability to organize, manage, and execute multiple tasks, with all due care and appropriate concern, within an aggressive schedule.

The disinterment and reinterment of human remains at Potter's Field involved a multitude of tasks performed by several groups and individuals. Some of the tasks had to be completed, at least in part, before other tasks could be initiated. Other tasks, such as hand excavation of human remains, screening of soil matrix, human osteological analysis, and recordation, could be done simultaneously for different remains by different team members. Therefore, the coordination and execution of activities and logistics demanded careful and constant management oversight. To accomplish this goal, the Project Manager and Principal Archaeologist coordinated tasks and administered all scheduling and logistics in consultation with key team members. Key team members were assigned specific activities according to their expertise and were responsible for assigning particular aspects of each sub-task to their respective team members, thus creating clear lines of authority and responsibility.

Given the variety of tasks associated with the overall disinterment/reinterment, field teams, each with a specific function, were established to ensure consistency of procedures and methods throughout the duration of the project. Designated field teams included stripping monitors, survey/mapping crew, excavation/exhumation crews, data collectors, laboratory group, and the reinterment unit. Each field team was supervised by a key team member or Field Supervisor, and the field teams were generally composed of Field Technicians/Archaeologists. The stripping monitor team usually consisted of three technicians working in concert with the general contractor to remove the soil overburden and identify grave shafts. Once the potential grave shafts were identified, then the survey/mapping crew, typically composed of three Field Technicians/Archaeologists, set survey stakes, numbered each shaft, recorded its geographic location, and downloaded locational information to generate an overall site map. After the shafts were numbered and surveyed, then the excavation/exhumation crews erected protective shelters over an area of possible grave shafts and began the actual disinterment process. The excavation/exhumation team consisted of between 10 and 40 Field Technicians throughout the duration of the project, with two or three crewmembers per grave shaft. Once human remains were identified and partially exposed in situ, the excavation/exhumation team notified one of the four data collectors that they were ready for recording of observations and scientific data and photographs of the identified burial. The data collectors were responsible for inputting all digital data — measurements, observations, and photographs — associated with each identified burial. All the human remains and associated objects from one burial were then placed in a container, covered, and then carefully hand carried to the on-site laboratory. The excavation/exhumation members then logged in the container and deposited it at the entrance to the laboratory. At this stage the laboratory staff, composed of two or three Field Technicians/Archaeologists and the Osteologists and Historic Archaeologist, began a process of checking in each burial, sorting and counting artifacts, cleaning the remains for osteological analysis, and placing the remains in the temporary morgue until reinterment.

As might be expected, each team interfaced with one or more of the other teams to maintain consistency of records, resolve concerns and issues, or provide important field and/or analytical results as they became available. For example, when the stripping monitors found additional shafts in areas previously excavated or in areas not expected to contain grave shafts, the survey/mapping team reviewed available evidence and then adjusted labeling and survey techniques to distinguish the discovery. When the laboratory staff established identities for some of the exhumed remains based on artifacts or other remains, the information was double-checked with the survey crew and then utilized to refine the interpretation and orientation of the available historical maps.

The ultimate success of this organizational structure and function is best exemplified by the overall results of the project: the quantity of data recovered, the identification and return of two sets of human remains to family descendants, and the disinterment/reinterment of 4,571 sets of human remains.

2. Staffing

One of the requirements for the successful completion of the Potter's Field project was the ability to provide senior administrative and technical staff for a year-long commitment while also allowing for a sizeable pool of Field Archaeologists/Technicians and support staff over an expected period of at least six months. The various tasks that would be required to complete this important project were initially presumed to be the identification and excavation of burials, osteological analysis of human skeletal materials, scientific recordation and photodocumentation, as well as numerous other field and analytical technical disciplines. As such, the Berger team members included archaeologists, osteologists, safety personnel, field technicians, logistical support, general contractor and laborers, security guards, licensed surveyor, electrician, mortician, and geophysical specialists.

All senior management and key professional staff members of the team were selected from Berger's roster of employees. This allowed for rapid, efficient, and cost-effective response to the project and promoted the collaboration of ideas early in the planning process. The Project Manager, Principal Archaeologist, Osteologist, and Health & Safety Officer constituted the core of the key team members. The remainder of the team consisted of a Historic Archaeologist responsible for the background research and inventory of all objects recovered from the burials, four Field Supervisors, one Crew Chief, one Document Control Coordinator, two logistics specialists, and approximately 50 Field Archaeologists/Technicians. Although the majority of staff members remained devoted to the project over its 186-day duration, several Field Archaeologists/Technicians had prior commitments and therefore replacement crew had to be hired and trained to maintain progress and adhere to the project schedule. In summary, over 130 individuals were employed as project team members over the duration of the project (Plate 5-28).

PLATE 5-28: Some of Potter's Field Staff Members

Given the unique nature of the project together with its anticipated duration and potential for steady employment, Field Archaeologists/Technicians quickly spread the news to friends and colleagues across the United States. Before long, potential crew members from Maine to Texas were inquiring about available position openings at Potter's Field. Local crew members from the metropolitan area of New Jersey and New York were quickly supplemented with experienced additional crew from Maine, Massachusetts, Pennsylvania, Maryland, Ohio, North Carolina, Kansas, Iowa, Louisiana, and Texas.

As the field effort was both exhausting and meticulous and the majority of team members had come to Secaucus from across the country, special accommodations and reimbursements had to be negotiated with the Turnpike Authority to maintain sufficient staffing to complete the project. Therefore, arrangements were made with two local hotels to house team members for an extended period of time. In addition, a daily meal allowance was provided for each out-of-state team member. Similar compensations were allocated to local team members for their daily travel expenditures and meals.

Specific subconsultant services were required to complete certain tasks associated with the project. In particular, a licensed mortician, surveyor, security patrol, geophysical investigator, and general contractor were utilized to successfully complete the Potter's Field project.

In accordance with state requirements and in order to execute the state permits for disinterment/reinterment, Jeffrey Macanka, Owner and Manager of the Introcaso-Angelo Funeral Home in Jersey City, New Jersey, provided special disinfectants, several coffins, transport services for selected remains, and guidance throughout the duration of the project. The Armand Corporation provided land surveying services particularly geared at tying the Potter's Field site to the Turnpike Authority's established datums. The Mac-Holland Security Agency, Inc., was employed to provide nightly, weekend, and holiday on-site security services at Potter's Field. Finally, Hager-Richter Geoscience was especially selected to perform ground penetrating radar (GPR) surveys and analysis in an effort to assist in the identification of grave shafts within Potter's Field.

The largest and most intensive of the subconsultant tasks was that of the general contractor's, Greentree Contracting. Greentree was responsible for providing all labor and equipment to perform the disinterment operations, including trackhoe, backhoes, front end loaders, and dump truck. Additionally, they were responsible for establishing perimeter site fencing, installation of all silt and water control systems, providing utilities (electric, water, and waste disposal) for the operation, all demolition activities, and handling/sorting of all debris.

3. Client Interaction

Initially and throughout the duration of the disinterment/reinterment, communication with the Turnpike Authority was critical to ensure that Berger thoroughly understood the Turnpike Authority's needs and intentions while also affording the Turnpike Authority the benefit of receiving ideas and insights from the Berger team. Berger's intent was that frequent exchange of information, ideas, and insights leads to faster execution times, a healthy and respectful partnering relationship, and, invariably, a better result and greatly increased project cost-effectiveness.

As such, Berger's Project Manager was responsible for all interactions with the Turnpike Authority regarding administrative, contractual, and technical matters as well as for maintaining regular progress reporting and for reporting on situations requiring immediate response. The majority of the daily and weekly progress reporting was performed via telephone, faxes, e-mail messages, or on-site meetings with the client. The client was apprised of the daily exhumation rates, weekly total of grave shafts identified, weekly totals of shafts/burials exhumed, weekly totals of box types for reinterment, and percentage of acreage cleared of human remains. Frequent on-site meetings were held with the client to review progress, resolve unexpected discoveries, and/or address particular concerns. Updated maps, field or historical data, informative and unique artifacts, and selected osteological remains were available for review and comment during each and every meeting. As necessary and at the direction of the Turnpike Authority, the attorneys representing the Turnpike, engineering consultants, contractor liaisons, and others also attended the on-site meetings to provide immediate resolution to any problems or issues. In situations requiring immediate response, the client and Berger's Project Manager utilized cellular and land-line telephone systems to maintain constant and effective communications. Finally, written progress reports were appended to each monthly invoice throughout the duration of the project.

4. Public Outreach and Relations

Americans generally view cemeteries as sacred places and human remains with concern insofar as they represent deceased individuals. The planned removal of graves from Potter's Field therefore had the potential to affect many people in the community and region. In fact, the instantaneous media attention created by the proposed project quickly necessitated that the Turnpike Authority take a lead role in handling all public relations issues.

As the project commenced and eventually expanded, so did the public outreach and coordination efforts. Initially, members of the media, potential relatives of the deceased, and interested constituencies voiced concern and/or opposition to the project. So as not to interfere with the progress of daily work at the site, the public was not permitted access to the site, and any persons wishing to access the site were required to contact the Turnpike Authority with their request. The Turnpike Authority would then consider the request and coordinate with the Berger team to determine an appropriate day and time for visitation to the site.

Pursuant to negotiations between the Andriani family and the Turnpike Authority in accordance with the Final Court Order, the Andriani family was kept apprised of work progress by the Turnpike Authority, particularly as it related to the efforts to identify Leonardo Andriani, their long-lost father/grandfather. Members of the Andriani family were also permitted access to the site provided that they supplied the Turnpike Authority with a 24-hour notice of their request.

As the days turned into weeks and the weeks into months, progress at the Potter's Field site led to discoveries that attracted even more media attention. As news of this extraordinary project — reported to be the largest single disinterment project conducted under a single contract in the United States — spread, so did the request for site visitation. Newspaper reporters, photographers, television crews, and radio announcers frequently requested visits to the site and often produced live on-site broadcasts. During these tours, interviews and discussions with Berger's key staff, Turnpike Authority administrators, family descendants, and others were also conducted (Plate 5-29 and 5-30). By the conclusion of the field effort over 60 newspaper stories had appeared, in the *Secaucus Reporter*, *Jersey Journal*, *The Record*, *The Star Ledger*, *Staten Island Advance*, *New York Times*, *Philadelphia Inquirer*, *Lancaster Pennsylvania News*, and *Albuquerque Journal* (New Mexico). Television coverage included the metropolitan/tri-state area evening broadcasts on Channels 4, 7, News 12, and NJN. The *New Jersey Monthly*, a magazine devoted to the people, places, and events in New Jersey, published a story about Potter's Field and the search for Leonardo Andriani. In addition, *Archaeology*, a publication of the Archaeological Institute of America, completed several site tours, interviews, and photographic sessions for their article entitled "The Dead at Snake Hill" published in the May/June 2005 edition of Archaeology Magazine.

Public outreach and coordination also included site visits and tours by the New Jersey Historic Preservation Office archaeologists, engineering consultants, and selected archaeologists from both New Jersey and Pennsylvania.


PLATE 5-29: Media Coverage at Potter's Field


PLATE 5-30: Television News Crew at Potter's Field

5. Court Order Compliance

For archaeologists, unanticipated discoveries are commonplace and often scientifically rewarding; however, during the Potter's Field project unexpected discoveries, though challenging and exciting, had serious legal and administrative ramifications.

Given the sensitive nature of the project together with the unique application of archaeological methods and results of specialized analyses, the Berger team was responsible for preparing information necessary for the preparation of legal briefs and certifications throughout the duration of the project. As previously mentioned, the project required a Disinterment/Reinterment Plan to be approved by the Court prior to initiation of the project. The Plan was submitted to the Court and defendants named in the case for review in November 2002 and approved in January 2003.

Execution of the Final Order and Judgment on January 31, 2003, however, was not the end of the legal proceedings in this case. Unexpected discoveries in the field and laboratory at Potter's Field necessitated several additional motions, briefs, expert witness testimony, certifications, and modifications to the Final Order and Judgment. The first unexpected field discovery occurred in April 2003, when the team identified a second level or "Lower Cemetery" beneath the central and southern portions of Potter's Field. The presence and exhumation of additional burials was not anticipated to be insurmountable until it was suspected that the limits of the Lower Cemetery extended under the existing Turnpike roadway, embankments, and bridge structural supports. Since the Final Court Order indicated that the Turnpike Authority was responsible for the disinterment/reinterment of *all* human remains, there arose an immediate concern and legal ramifications about leaving any human remains under the roadway and bridge structures. The attorney representing the Turnpike Authority therefore prepared a Notice of Motion seeking the Court's approval to leave undisturbed and in place all potential burials beneath the Turnpike's roadway. In support of the Turnpike Authority's Motion, certifications (defined as written narrative affirmations of statements) and expert witness testimony by the Turnpike administrators and Berger's Project Manager were required.

In addition, the discovery of larger than expected amounts of wood coffin remnants and the need to modify the methods of excavation, storage, and reinterment for these materials required a Court hearing and modification to the Final Court Order. The Court also had to approve the change in personnel completing the actual reinterment, the selection of the final reinterment cemetery, and procedures for preparation and installation of burial vaults. In general, the slightest refinement or modification to any task detailed in the Disinterment/Reinterment Plan necessitated legal actions and the Court's approval.

Some of the most noteworthy of all legal proceedings were the two motion papers filed by living lineal descendants to have the Court approve the release of identified remains of family members to their respective families for private reburial. In each case, Berger's Project Manager and Osteologist were required to prepare certifications stating and supporting their methods and findings for the Court.

D. PRE-FIELD TRAINING

Prior to the initiation of fieldwork, key staff and selected Field Supervisors and Field Technicians/ Archaeologists attended a two-day training session in Berger's East Orange, New Jersey, office.

The first day was primarily an orientation to the project, detailing the administrative protocols and procedures. An overview of the history of the Potter's Field site, Berger's scope of work, and items contained in the Final Court Order were discussed. In particular, all team members were informed of the reverence and respect rule that would be imposed while on-site. They were asked to conduct themselves in a professional and dignified manner at all times and to refrain from discussing their experiences in the general public and community of Secaucus, given the high-profile nature of the project. Other administrative issues consisted of an introduction of key staff and organizational structure; a review of the health and safety requirements and plans, including the company's arrangements for all staff to receive tetanus shots; OSHA regulations regarding excavations; safety precautions around heavy equipment; hours of operation at the site; and amenities to be provided to them while on site.

The remainder of the pre-field training was devoted to several osteological classes and exercises. The training was conducted by the Project Osteologist and focused on teaching Field Technicians/Archaeologists how to recognize key morphological traits, and how to quickly determine age, gender, and stature during excavation of the human remains. Laminated manuals were provided to each excavation team for quick osteological reference, as needed. Each excavation team then went through several hands-on exercises to become familiar with the measurement of long bones, determination of gender, observation of morphological traits, and protocol for the excavation of human remains.

As the project progressed, additional training was conducted on-site to familiarize staff with the use of new hardware and software. This included specific training in the use of the total station, photographic equipment, and application of software programs to assist in the interpretation of data.

E. EQUIPMENT AND SUPPLIES

In order to convert the Potter's Field site into a fully functional, self-contained field office and laboratory that could provide the analysts, excavators, client and others with up-to-the-minute or daily information, a variety of equipment and an assortment of supplies had to be readily available on-site. The range of equipment and amount of supplies utilized at Potter's Field was substantively greater than most typical archeological projects. Each of the designated work and general staff areas, including the former detention center buildings, office and safety trailers, outdoor work areas, and shelters, had their own devoted set of equipment and supplies (Table 5-1).

Aside from the vast quantities of standard archaeological field and laboratory tools, equipment, and supplies (Plate 5-31 thru 5-34), the Potter's Field project utilized unique apparatuses. Four metal towers, commonly referred to as Quadrapods, were specially designed and manufactured by Berger to straddle each burial shaft and serve as a platform from which computerized photographic documentation activities could be performed. A digital camera and laptop computer were mounted onto each tower for photographic recordation, quality control, and ease of documentation (Plate 5-35). In addition, mechanical screens attached to gas-powered generators were also utilized in the field to assist in the recovery small bones and personal effects excavated from grave shafts.

PLATE 5-31: Exhumation Under Shelters

PLATE 5-32: Screening Back Dirt Piles

PLATE 5-33: Excavation and Screening

PLATE 5-34: Surveying

PLATE 5-35: Quadrapod Over Grave Shaft During Documentation

TABLE 5-1

EQUIPMENT AND SUPPLIES, POTTER'S FIELD SITE

SITE LOCATION	EQUIPMENT	
Detention Center	*Miscellaneous*	*Supply Storage Area*
	Fire extinguishers	Leahy boxes (5,000+)
	First aid kits	Contractor bags (2,000+)
	Free standing lights	Resealable plastic bags, various sizes
	Hasps	Disposal gloves, various sizes (500+ pairs)
	Large shop vacuum	Tyvek coveralls
	Mop and bucket	Hard hats (75+)
	Notice board/bulletin board	Shovels and spades
	Padlocks	Chain saw, axes
	Plywood, 3/8”	Soil probes/augers
	Propone heaters	Aluminum tags
	Sheeting plastic (clear, heavy)	Wooden hubs, 2”x2”x12”
	Trash bags, 35 gallon	Nails and screws
	Trash cans, 35-gallon plastic (4)	Hammers, plyers, wrenches, screwdrivers
	Water heaters	Tape measures, metric/English (30 meter)
	Cafeteria Area	*Laboratory*
	Bottled or potable water	Air conditioners
	Coffee makers (3)	Articulated skeleton
	Coffee, tea, hot chocolate, cream, sugar, etc.	Bean bags
	Detergent, dish & floor	Free standing lights (3)
	Electric heaters	Laptop computer (1)
	Microwave ovens (2)	Magnifying glasses
	Paper plates	Microscope
	Paper towels	Modeling clay
	Refrigerator	Osteometric board
	Styrofoam cups	Reference books
	Toaster oven (1)	Restacked existing bunk beds for shelving
	Used chairs and couches	Scales
	Utensils, plastic forks, spoons, knives	Spreading and sliding calipers
		Stools and office chairs
	Locker Rooms	Tweezers, dental picks, soft brushes
	Each team member received:	Ventilating fans
	Boxes for personal effects storage	Wash basins
	Hooks for extra clothes	
		Data Management Area
	Temporary Morgue	11x17 color printer (1)
	Flashlights	CD-R discs for data storage (500+)
	Free standing lights (2)	Laptop computers (4)
	Hand truck	Nikon cameras D100 (4)
	Office supplies	Office supplies
	Wooden pallets	Photographic scale/north arrow
		Scanner/printer fax machine (1)
		Photographic scale/north arrow
		Scanner/printer fax machine (1)
Office Trailer	Air monitoring equipment	Large graph paper
	Binders, 3 ring	Large paper pad for easel
	Book shelves	Miscellaneous office supplies
	Desktop computer	Office chairs
	Digital thermometers	Paper, 8-1/2 x 11
	Drafting table	Printer/fax machine
	Filing cabinet	Table for field mapping
	Fire extinguisher	Total station, tripod, prism, & pole
	First aid kit	Wall mounted calendar
	Landline telephone	

Health and Safety Trailer	Antibacterial soap Electric heater Shampoo Terry cloth towels Toilet paper	
Outdoor Work Area	Backhoes (3) Boards, 2" x 12", wheelbarrow roads Dump truck (1) Dumpster/waste disposal service containers Front end loader (1) Knack boxes (2)	Large tarpaulin covers Open shelter for total station Porta-a-Johns (6) Quadrapods (4) Torpedo heaters (4) Trackhoe (1) Wheel barrows
Shelters	Boards, 2'x12" x 10' (10) Boards, 2"x4" various lengths (20) Buckets, 5 gal (100) Extension cords, heavy duty, 100ft (8) Fans Fire extinguishers First aid kits Free standing lights (12) Fuel, diesel, propane, kerosene Generators	Heaters, kerosene or propane (6) Levels line Mechanical screens Plywood, 4'x8', ¾" (10) Portable generators, 5kw (2) Romex, 10 gauge with 4-gang, grounded outlet boxes & plugs, 100 ft (4) Sand bags (200) Shaker screens (standard) Shelter, large 20x36x12 (2) Shelter, small 14x24x14 (2)

CHAPTER 6. DATA RECORDATION AND FIELD PROCEDURES

A. INTRODUCTION

The Potter's Field disinterment program presented the Berger team with the challenge of collecting and managing large, multi-variable data sets. Although the primary goal of the project was to remove human remains from the project area and reinter them at another cemetery, this task required, at a minimum, recordation and management of data relating to the original location of each burial, the skeletal and artifact content of each burial, and the ultimate location of each burial in the reinterment cemetery. Moreover, project contingencies required a flexible data management system that could accommodate unanticipated discoveries and queries.

The initial stages of the fieldwork were essentially exploratory since neither the location of any grave nor the boundaries of the Potter's Field burial ground were known with any certainty. The process of finding individual graves and burial ground boundaries was typically archaeological in that information gleaned from early excavations informed placement and methodology of subsequent excavations. As such, it was necessary that the data management system be designed to process information quickly and efficiently and make results of fieldwork and analyses readily available to those planning and executing subsequent work as soon as possible.

The need to identify individuals interred in the burial ground by name was brought into focus by descendants of individuals buried in Potter's Field who wished to identify their ancestors and provide them with a private and separate burial. The need to accomplish this identification task required the acquisition and analysis of data regarding the gender, stature, age at death, pathologies, anomalies, and associated artifacts of each burial as well as the spatial relationships among burials and their characteristics. These data then had to be compared with the data collected from the Burial Register and available maps of Potter's Field.

In addition, involvement in the project afforded the Berger team a rare opportunity and an ethical imperative to characterize the burial population with regard to a wide variety of physical and cultural characteristics. In consultation with, and with the support of, the Turnpike Authority, Berger incorporated into the investigation the collection and processing of background information on the institutions and communities from which the burial population came and information sufficient to allow characterization of the burial population itself. Such information includes comparative data relating to health, ethnicity/race, occupation, and social status variables. Characterization of the burial population with regard to these variables demanded more robust osteological and artifact analyses than mere exhumation and relocation required.

B. BURIAL INVENTORY FORM

To ensure that the development of the burial inventory data system met the overall information needs of the relevant disciplines, the Project Manager, Principal Archaeologist, Field Supervisor, and Project Osteologist were involved throughout the system's development. The system's first and fundamental source of information was the Burial Inventory Form, through which field observations and measurements entered the computerized database. The form was organized into three main sections: photographic, archaeological, and osteological. Administrative data were also included on the form: the date and names of exhumation team members, data collector, crew chief, and the field supervisor. The data file used to store burial information from the field included 60 direct input and calculated variables for each of the 4,571 exhumed burials. These consisted of four administrative variables, 24 archaeological variables, and 32 osteological variables. Of these, two variables, stature and orientation, were calculated from field measurements.

The photographic section included a high-resolution photograph and the name and directory of the computer file storing the photograph. Photographic files were .jpg files labeled with the shaft and burial number. For example, the photograph for burial 1000A was "1000A.jpg."

Following are listed the data entry fields for the archaeological section of the form with the instructions that were provided to the exhumation teams for ensuring the standard collection and recordation of appropriate information.

Burial Shaft Number. Enter the number of the burial shaft as assigned by Berger's surveyor. Prior to excavation shaft numbers will have been arbitrarily assigned in the order in which the exposed shafts were surveyed with the total station. Shaft numbers (i.e., 237) will be affixed to each of two stakes marking the head of the shaft (the "head stake" [237H]) and the foot of the shaft (the "foot stake" [237F]). The head of the shaft will always be the most northerly end of the shaft. The foot of the shaft is the other end.

Shaft Marker Number. Some of the shafts may have markers, possibly a wooden board or a concrete/ceramic cylinder, on which the shaft number is inscribed. Enter the number inscribed if discernible. Enter "P" if a marker is present but the inscription is not legible.

Burial. Burials in each shaft will be assigned an alphabetical designation by the excavators as they are encountered. The first burial encountered in each shaft will be designated "A," the next "B," etc.

Burial Depth. Enter the distance between the highest point on the cranium and the ground surface at the head stake in meters.

Commingled Burials. If individual burials within a grave are not distinguishable, then, if possible, determine the minimum number of individuals (two skulls, three pelvises, five right femurs, etc.), assign an appropriate number of alpha designations, complete a BURIAL INVENTORY FORM for each. Indicate, on each form, with which others the subject burial is commingled. Box all commingled remains together and label with all associated burial alphabetical designations. If the number of individuals cannot be determined, then assign a single alphabetical designator for all. If the elements used to determine the number of individuals present are elements useful in age, stature, and/or gender estimates, then record the variables and bag and label the elements separately. Separate soil for screening or box with the remains, and collect and bag any non-skeletal items and send them with the material to be screened or to the laboratory (see Burial Preservation, below).

Non-Skeletal Items. Darken the circle to the left of "NON-SKELETAL ITEMS?" if materials (clothing, jewelry, etc.) are present that are not actual human remains. Collect and bag any non-skeletal materials and send with the material to be screened or to the laboratory (see Burial Preservation, below) in bag(s) labeled with appropriate shaft and burial designators. Checking this box will notify the laboratory personnel that they should receive and inventory non-skeletal materials.

Burial Location. Darken the circle to the left of the word that describes the burial's relative location (top, middle, bottom, left, and/or right). When looking from the foot of the shaft to the head of the shaft, right is right and left is left.

Burial Location Options: Top, Middle, Bottom, and (possibly) Left, Right.

Burial Position. Darken the circle to the left of the word that describes the position or attitude of the burial (i.e., extended, flexed, disarticulated, etc.). If the position is other than those listed, then darken the circle to the left of "Other" and describe in the box labeled "Other Position." If the position cannot be determined, then darken the circle to the left of "Unknown."

Burial Position Options: Extended, flexed, semi-flexed, disarticulated, unknown, other. If "other" describe in box below.

Burial Orientation. Enter the orientation of the burial from foot to head in clockwise degrees from magnetic north.

Coffin. Darken the circle to the left of the word that best describes the shape, in plan view, of any coffin found in association with the burial. Darken the circle to the left of "Unknown" if a coffin is present but its shape cannot be ascertained. Darken the circle to the left of "None" if no evidence of a coffin is present. Describe in the box labeled "Other Coffin" any shape not listed. If the coffin material is other than wood, then describe the material under "COMMENTS."

Coffin Options: Rectangular, hexagonal, tapering, unknown, none, other. If "other" describe in box below.

Burial Preservation. Darken the circle to the left of the word that best describes the condition (poor, fair, good, or excellent) of the burial. Let the following be your guide:

Poor: Skeletal elements are not discernible as separate entities. They have disintegrated to the point that their removal requires removal of the shaft matrix.
Fair: Skeletal elements are discernible as separate entities and some elements are measurable but cannot be removed intact.
Good: Skeletal elements, though somewhat deteriorated, are in good enough shape for in situ measurement and intact hand removal.
Excellent: Skeletal elements are not deteriorated and can be easily measured after removal without risk of breakage.

Soft Tissue Present. Check the box to the left of "SOFT TISSUE PRESENT?" if human remains other than skeletal material are present.

Skeletal Completeness. Estimate the percentage of an entire skeleton that actually is present. Darken the circle to the left of the appropriate percentage.

Skeletal Completeness Options: <25%, <50%, <75%, >75%, 100%

Skeletal Parts. If the remains represent an amputated limb or other skeletal fragment, then describe the remains in the box labeled "SKELETAL PART(s)."

Following are listed the data entry fields in the osteology section of the form with instructions that were provided to the exhumation teams for ensuring the standard collection and recordation of appropriate information.

Age at Death. Based on the age evidence, darken the circle to the left of the word that describes the burial's age at death. If the remains are apparently of an adult but no more specific age determination can be made, then darken the circle to the left of "Adult." If the evidence is not available or, because of condition, cannot be observed, darken the circle to the left of "Unknown."

> **Age at Death Options**: Fetus, <3, <12, <20, <35, <50, 50+, Sub-Adult, Adult, Unknown.

Age Evidence. Darken the circle to the left of the word that describes the evidence used to estimate the age at death of the individual. More than one may be used.

> **Age Evidence Options**: Dentition, bone formation, ossification centers, suture closure, epiphysis union, size, not determinable.

Stature. Do not estimate the stature. Enter the maximum length (mm) of one of the elements in the box to the right of the word "STATURE." Darken the circle to the left of the skeletal element measured. The list is in order of reliability. If the first element ("Femur") cannot be measured or is questionable, then measure the next element ("Tibia") on the list. Continue down the list of skeletal elements until a reliable measurement can be made and entered. If no listed elements are measurable, then darken the circle to the left of "Unknown."

> **Stature Options**: Femur, tibia, fibula, humerus, radius, ulna, unknown.

Gender. Based on the gender evidence (below) darken the circle to the left of the word that describes the burial's gender. If the evidence is not available or, because of condition, cannot be observed, then darken the circle to the left of "Unknown."

> **Gender Options**: Male, female, unknown.

Gender Evidence. Darken the circle to the left of the observations that contributed to the gender determination.

> **Gender Evidence Options**: Ventral arc, sub-pubic concavity, ischiopubic ramus edge, greater sciatic notch, nuchal crest, mastoid process, supra orbital margin, mental eminence, gonial angle, clothing, none

Pathology. After "Evidence" describe any evidence of trauma, pathology, or other anomalies, and describe after "Location" on which skeletal elements the evidence is present.

C. ADDITIONAL DATA SETS AND SOFTWARE REQUIREMENTS

Additional computer data files were created for information derived from analyses done subsequent to the exhumation of remains. Microsoft Excel was used for input, storage, and organization of the artifact inventory (over 113,000 entries – 10 variables), computerized Burial Register (over 7,000 records – 18 variables), mapping coordinates (in excess of 20,000 records – 5 variables), results of the detailed osteological analysis (409 records – 40 variables), reburial inventory (4,569 records – 10 variables), and updates of the Burial Inventory Form exported from Microsoft Access (4,571 records – 60 variables). Excel also was used to manage, sort, and analyze data from several sources used to identify (name) individual burials (4,571 records – 25 variables).

Mapping was accomplished using Golden Software's Surfer 7 and Autodesk AutoCAD 2000 in concert with the Microsoft Excel mapping coordinate files. Repeated transfer of thousands of map coordinates and spatially associated variables from Excel into AutoCAD was facilitated by AutoCAD's scripting function. Scripting allowed rapid cartographic presentation of spatial distributions of particular burial population characteristics, such as gender, age at death, pathologies, institutional source, burial depth, artifact classes, etc. Surfer was used to generate contour maps both topographic and thematic. Use of these programs allowed Berger to generate presentational and linear data quickly for use in technical and logistical planning on a day-to-day basis.

Digital photographs of the progress of work, changing weather conditions, and other miscellaneous events and overviews were downloaded and stored in directories separate from those containing the Burial Inventory photographs. A total of 8,370 non-Burial Inventory digital photographs were taken and filed during the project. In addition, hundreds of color print and slide photographs were taken and manually organized by date and subject.

Analyses of these data often required combining subsets of data from one or several files into separate, single computer files. For example, mapping of particular, field-derived archaeological variables, such as coffin shape, preservation, or presence of artifacts, required combining the relevant variables from the Burial Inventory file and the mapping coordinate file. Mapping of osteological variables required similar file combinations.

Perhaps the most complex analyses undertaken during the project was Berger's attempt to identify unmarked individual remains. The information germane to the identification process included mapping data, gender, age at death, burial location (position in shaft), associated artifacts, pathologies, anomalies, and information from the computerized Burial Register. These various data were resident in several computer data files and required repeated, sequential file combinations (Table 6-1). In addition, computerized cartographic overlays had to be generated to allow spatial comparisons among the various previously acquired maps of the burial ground and those generated as a result of Berger's mapping of recovered remains.

TABLE 6-1

SUMMARY OF DATA VARIABLES

DATA FILE	RECORDS	VARIABLES	TOTAL VARIABLES
Artifact Inventory	113,000	10	1,130,000
Burial Register	7,000	18	126,000
Mapping Coordinates	20,000	5	100,000
Detailed Osteological Analysis	409	40	16,360
Reburial Inventory	4,569	10	45,690
Burial Inventory Form	4,571	60	274,260
Identification Files	4,571	25	114,275
Total	**154,120**	**168**	**1,806,585**

D. DATA RECORDATION AND MANAGEMENT HARDWARE

Field data, including photographs, were collected and temporarily stored on four Dell Latitude laptop computers. Burial photographs were taken with four Nikon D100, 5 mega-pixel digital cameras. Photographs were stored on a 256 megabyte Sandisk memory card in each camera and were also immediately transferred to the Dell laptops by direct cable connection. Data were copied from the laptops to a Dell desktop computer at the end of each workday. Cumulative burial data were copied to writable CDs at the end of each workday and remained resident on the laptop and desktop hard drives for the duration of the project. Cumulative burial inventory and other data files were periodically copied to Berger's network server in East Orange, New Jersey. Computer cartography, and management of mapping files were performed on a Dell desktop computer dedicated to the survey and mapping of the Potter's Field site.

E. IDENTIFICATION, MAPPING, AND DISINTERMENT PROCEDURES

1. Identification and Marking of Grave Shafts

Monitoring of soil stripping activities focused on identification of grave outlines. When soil characteristics, such as color and texture differences, were exposed that suggested the presence of a grave, mechanical excavation ceased and the monitoring teams removed additional soil by hand to assess whether a grave was present. Grave soil was generally darker than the surrounding matrix of lighter colored subsoil as it is a combination of darker topsoil mixed with lighter subsoil and is further darkened by the organic decay of coffin wood and human tissue. When freshly scraped, the subtle differences between grave fill and surrounding subsoil were usually apparent. Once distinguished, the Monitors marked apparent grave outlines with nails and string (Plate 6-1).

PLATE 6-1: Marked Grave Shaft Outlines

Once the graves were located and outlined, the survey/mapping team placed a wooden stake at the head and foot of each grave to facilitate mapping and subsequent exhumation. Each grave was given a unique identification number to facilitate administrative record keeping. Each number was impressed on aluminum tags by the survey crew and then nailed to each wooden stake. Head stakes were additionally labeled with an "H," and foot stakes with an "F," as described above. The survey/mapping crew then recorded the coordinates of both the head and foot stakes of each grave.

2. Land Survey and Mapping

Berger's surveying was accomplished with a Topcon GTS-300 Total Station and single prism (Plate 6-2). A dedicated team of four members (instrument operator, rod holder, survey field data recorder, and cartographer/data input person) performed all surveying and mapping tasks. The survey team was responsible for recording the locations (X, Y, and Z coordinates) of all natural and artificial features in the project area and the locations of all archaeological excavations and features (graves). Though the main datum was occupied for the majority of the shots taken during the earlier field work in the southwestern portion of Potter's Field, 21 additional survey stations were established and occupied to map around obstructions, to record locations in other portions of the burial ground not visible from the main datum, and because many stations had to be abandoned to allow excavations at their locations.

PLATE 6-2: Total Station

Survey data, including target, X, Y, and Z coordinates, and comments, were hand-recorded on pre-printed survey forms. The cartographer entered survey data daily in a Microsoft Excel spreadsheet. Computerization of the survey data allowed maps to be updated daily, depicting locations of all exposed graves and their relationships to natural and artificial features in the project area. Daily mapping was critical to the process of boundary definition, identification of individual burials, and excavation logistics.

3. Exhumation Protocol

Standard field procedures were utilized to ensure the orderly and respectful treatment and handling of human remains. Each exhumation began with hand removal of grave fill using shovels, trowels, brushes, and smaller tools as appropriate. Soil overlaying the burial (above first contact with skeletal remains) was removed and discarded. All remaining soil in each grave was screened to recover small bones, personal effects, and coffin elements. Typically the starting point of each exhumation was at the head stake. Three reasons dictated this approach. First, the skull is one of the most rugged elements of the human skeleton and therefore more resistant to organic decay than other bones. If decay had progressed to the point where cranial bones were poorly preserved, then it was unlikely that post-cranial elements would be found intact. Second, in a supine position the frontal elements of the skull tend to be higher than other parts of the skeleton. Even if the head had turned to the side, the skull would more likely to be highest. Finally, because the Potter's Field graves were, usually, oriented with the head to the north and the feet to the south, establishing the location of the skull helped verify the monitoring crew's preliminary delineation of grave outlines.

Once the skull was exposed, grave fill was carefully removed to expose sequentially the upper limbs, ribs and vertebral column, and lower limbs. The innominate (pelvis) was the final skeleton element to be exposed because it contains the clearest and most reliable information concerning gender.

Excavation crew members examined the exposed human remains *in situ* and recorded all measurable/observable metric and non-metric osteological traits (Plate 6-3). All field measurements and observations were immediately entered in a Microsoft Access database resident on a field computer. All grave fill was screened for the recovery of artifacts, and small bones. Remains were photographed *in situ* and the photograph was immediately downloaded to the field database.

PLATE 6-3: Osteometric Calipers

After the data were recorded, all skeletal material and artifacts from each burial were collected and placed in separate burial containers. Remains from an identifiable single individual were placed into a single container. Multiple remains from a grave or commingled remains that could not be differentiated were placed into a single container for that grave. As human remains were removed from their graves and placed into containers, the filled containers were carried to the on-site laboratory for check-in, analysis, and interim storage.

Exhumation teams screened all soil excavated from graves through ¼-inch hardware mesh to retrieve artifacts, small bones, and bone fragments not collected during the initial exposure and subsequent exhumation (Plate 6-4). All artifacts and small bones, whether recovered from the screen or *in situ* within the grave, were bagged, identified by grave and burial number, and stored with their associated human remains. All recovered artifacts were, after inventory and analysis by the on-site laboratory staff, replaced in the burial container and reinterred along with the associated human remains.

PLATE 6-4: Soil Screening

4. Field Data Collection

Where preservation and completeness of skeletal elements allowed, Berger's team completed archaeological and osteological observations and measurements (see above section of this chapter), and photographically recorded each burial during its exhumation. The length of the long bones was measured with a standard osteometric board or sliding caliper for determining stature. Depth of each burial was measured with a metric tape from the ground surface at the grave's head stake to the top of the cranium. Orientation of the grave was determined by magnetic compass from the foot of the grave. In addition, the burial was examined for skeletal indicators of gender and age and for indicators of pathologies and anomalies.

The condition of the remains dictated how measurements were taken and how observations were made. If the remains were in good condition (able to be removed without breaking), then skeletal elements were removed, measured and examined in-hand. If the skeletal elements were too fragile to remove without breaking, then measurements and observations for gender, age, stature, pathologies, and anomalies were made *in situ*.

At times, ground conditions affected the exhumation crews' ability to take accurate measurements and make reliable observations. Groundwater was a particular problem. In these situations many burials had to be removed, by feel, while submerged. Those that were too fragile to be removed intact could not be measured, nor could reliable observations be made of fragmentary remains, once removed. In other areas the soil matrix surrounding burials near the surface, especially in the vicinity of the Detention Center, was very compact. In these settings many of the burials themselves were compacted and too fragmented and/or deformed to yield reliable data.

At the start of the project field teams immediately relayed the results of their measurements and observations to one of four crew members designated as Field Data Collectors, who entered the information directly into Berger's Burial Inventory software resident on laptop computers. The Field Data Collector also took a high resolution photograph of each fully exposed, *in situ* burial and added the photograph to the electronic record for that individual burial. The digital camera was suspended above the open grave by a metal four-legged frame, or Quadrapod, that straddled the grave. The camera was connected to and controlled by the laptop computer also mounted on the frame.

As additional staff was added and the overall size of the exhumation team increased, the scale and pace of the disinterment program increased. As a result, immediate data entry and the pace of fieldwork began to slow because exhumation teams had to wait for increasingly longer periods for the next available data collector. These waits were exacerbated by the need for exhumation crews to take measurements and make observations of burials after the photograph was taken. In response, reusable laminated sheets that replicated the electronic Burial Inventory Form were created. The exhumation teams collected data and manually recorded them onto the laminated forms after the photographic was taken. After completion, each form was collected by the Field Data Collector(s) and its resident data added to the Burial Inventory database as time allowed but always by the end of each working day.

CHAPTER 7. EXCAVATIONS AND EXHUMATIONS

A. INTRODUCTION

"Bless the work of this disinterment, as we seek to honor the memory of these deceased by moving them to other hallowed ground. May our work here be as reverent and thorough as humanly possible."

The above is a portion of a prayer given at a multi-denominational service of remembrance organized by the Turnpike Authority and Berger. The ecumenical service was held on February 9, 2003 and attended by Berger and Turnpike Authority staff, members of the local community, families of the interred, interested community members, and ministers from four local churches.

The words are an accurate reflection of Berger's overall approach to the Potter's Field project and of the feelings that motivated all those involved. Technically, the project involved locating and disinterring human remains, and documenting the burial ground, but to the Berger team it was much more. Berger's team members considered the project an opportunity to show respect for and to honor those individuals who were buried at Potter's Field and long forgotten.

This chapter describes, in detail, the complex technical work involved in locating, removing, and reburying the thousands of men, women, and children interred at Potter's Field. The planning and execution of Berger's technical methodology was undertaken with concern and respect for all those buried within the burial ground.

B. PRIOR EVIDENCE OF BURIAL GROUND BOUNDARIES AND LOCATIONS OF INDIVIDUAL GRAVES

Prior to and during the early stages of fieldwork, Berger made an effort to predict the number and locations of graves and burials within Potter's Field. As described in Chapter 4, based on the Turnpike Authority's estimates, Berger initially anticipated exhuming approximately 3,500 individuals from 1,200 graves in an area measuring approximately 4,679 square meters (1.16 acres). Close examination of the available maps and the Burial Registers for the Hudson County Burial Grounds, however, suggested that these early estimates may have been in error.

As was discussed in Chapter 4, several historic maps were available that showed, directly or by inference, the general location of Potter's Field. Four maps were used to estimate the location of the southern extent of the elevated ground on which Potter's Field was originally located. These maps include the 1907 County Properties Map (see Figure 4-8), the 1931 topographic survey of the project area (see Figure 4-10), the 1940 USGS topographic quadrangle (Figure 7-1), and the Turnpike Authority's 1998 survey map of the project area and vicinity.

The 1907 map depicts a line demarcating the southern boundary of "High Ground". The 1931 topographic survey map shows contours of the elevated ground bounded by "Swamp(s)" to the south and west. The 1940 USGS quadrangle depicts a crescent-shaped area of elevated ground at the location of Potter's Field. The 1998 Turnpike Authority contour map of the project area and vicinity shows a modified configuration of the boundary between elevated ground and wetlands as it includes the results of recent modifications to the terrain by construction-related activities. The locations of the high ground and, particularly, its southern extent on the 1931, 1940, and 1998 maps correspond fairly well with location of

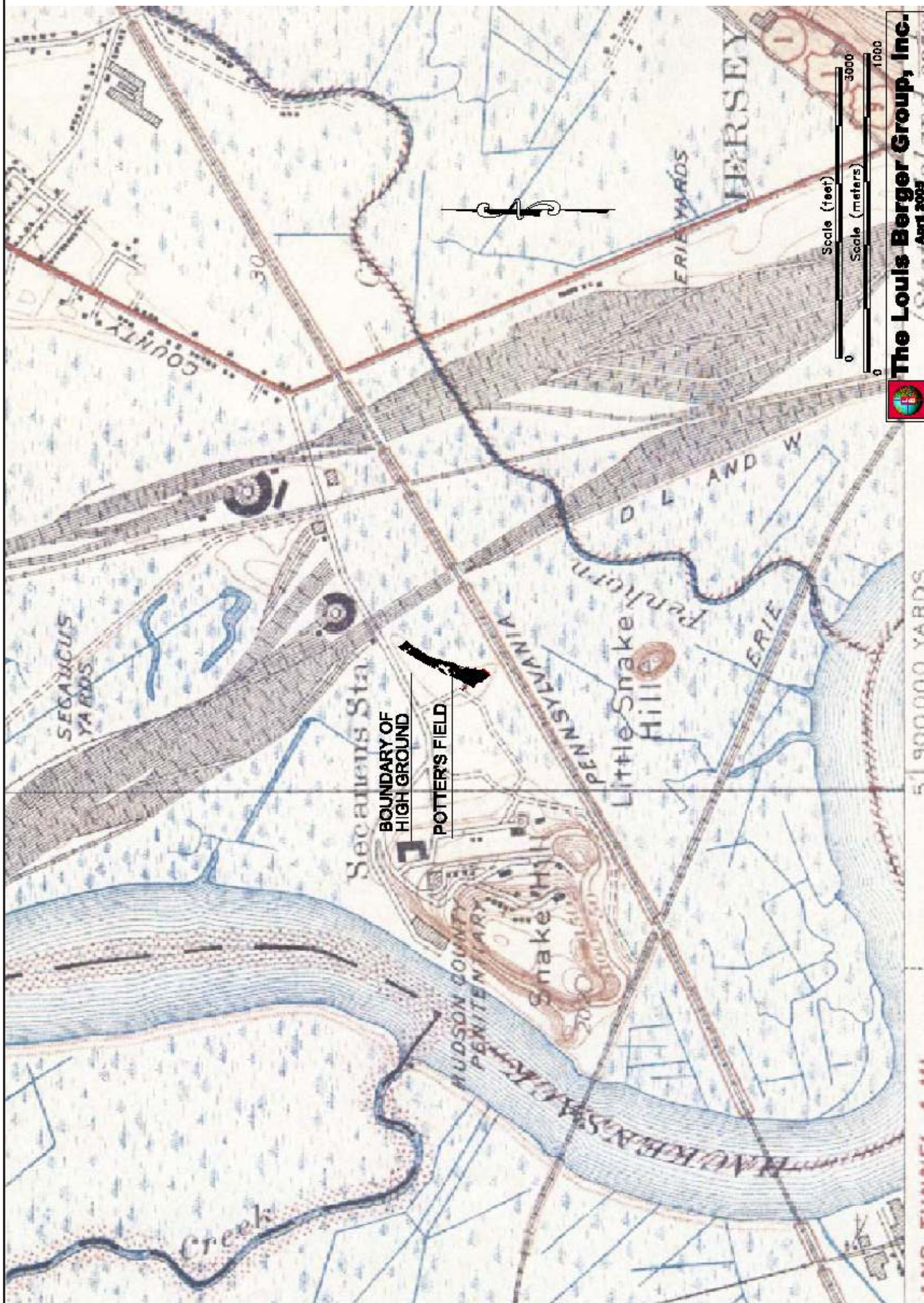


FIGURE 7-1: 1940 USGS Showing Crescent-shaped Elevated Ground at Location of Potter's Field

the southern boundary of high ground illustrated on the 1907 map. Figure 7-2 summarizes the information gleaned from these maps concerning the location of the southern boundary of the high ground.

In addition to a review of the topographic setting of the project area, several maps were consulted that showed the location of portions of Potter's Field. The 1907 map of Hudson County properties (See Figure 4-8) depicts three areas labeled "Burial Grounds"; the eastern most being shown on "high ground" at the location of Potter's Field. The 1931 topographic map of Laurel Hill (See Figure 4-10) depicts the earliest available contours of Potter's Field with useful (1-foot) contour resolution. The map depicts a 100-foot by 200-foot rectangular area referred to as "Approximate Location of Burial Ground" that is located on high ground under and north of the location of the existing Turnpike bridge.

Hudson County Engineering Department Maps No. 1188 and its 1941 "1188 Addenda" (See Figures 4-11 and 4-12) depict the southwestern portion of Potter's Field divided into 12 sections. Map No. 1188 shows mapped grave board locations (wooden grave boards or head boards marked the location of grave shafts within the burial ground) and the locations of corner monuments ("Mont.) delineating the limits of sections 1 thru 10 within the burial ground. Map No.1188 Addenda only shows the section boundaries and monument locations for the western portion of sections 8 and 11 and a portion of section 12. Map No. 1188 Addenda also depicts the location of grave boards 5984, 5094, and 6163. Both maps include tables containing measurements to grave boards as triangulated from the various monuments or corner markers.

Computerization, sorting, and mapping of the tabulations on the Hudson County Engineering Department maps revealed that the tabulated lot (grave) numbers range from 5317 to 5970 on Map No. 1188 and from 5971 to 6232 on Map No. 1188 Addenda. The Burial Registers indicate that two individuals were interred in grave 5317, the first on March 13, 1923 and three individuals were interred in Lot 6232, the last on December 18, 1941. The combined total of graves plotted and/or tabulated on Map No. 1188 and Map No. 1188 Addenda is 871, however, 50 grave numbers are missing from the series. In contrast, the Burial Register lists 921 graves containing 2,170 burials between these dates (1923-1941).

Prior to beginning fieldwork, Berger acquired the Hudson County Engineering Department Map No. 769 revised in 1928 (see Figure 4-13). Map No. 769 was problematic. Though it depicted a single point within a portion of the burial ground which was triangulated to two, no longer extant, numbered utility poles (60068 and 60069) on the south side of New County Road, no map was available depicting the locations of these poles in relation to New County Road. It was initially suspected that some of the graves depicted on this map may have been buried under the detention center but locations east and west of the detention center were also posited. After several searches at the Hudson County Engineering Department, a sketch map was found in April 2003 showing the locations of the two utility poles referenced on Map No. 769. Triangulation from these pole locations plotted some of the western graves depicted on the map under the east building (building B) of the detention center approximately 90 meters west-northwest of the most northeastern grave depicted on the Map No. 1188 Addenda. The easternmost graves on Map No. 769 were approximately 60 meters east of the easternmost detention center fence line.

Map No. 769 depicts the locations of 421 graves beginning with grave number 4861 (May 13, 1916) and ending with grave number 5316 (March 10, 1923). Of the 319 grave locations that are labeled, 13 numbers are duplicates leaving 306 accurately labeled graves. A total 150 numbers are missing from the unduplicated grave numbers between 4861 and 5316 with an interesting gap of 50 numbers between 5096 (September 14, 1918) and 5145 (March 3, 1919). A total of 102 grave locations are not labeled. The Burial Register lists 456 graves containing 1,072 burials for this suite of grave numbers. This discrepancy may be partly answered by the notation contained on Map No. 769 which reads:"…where numbers are not given, the headboards are undecipherable, due to weathering an(d) brush fires."

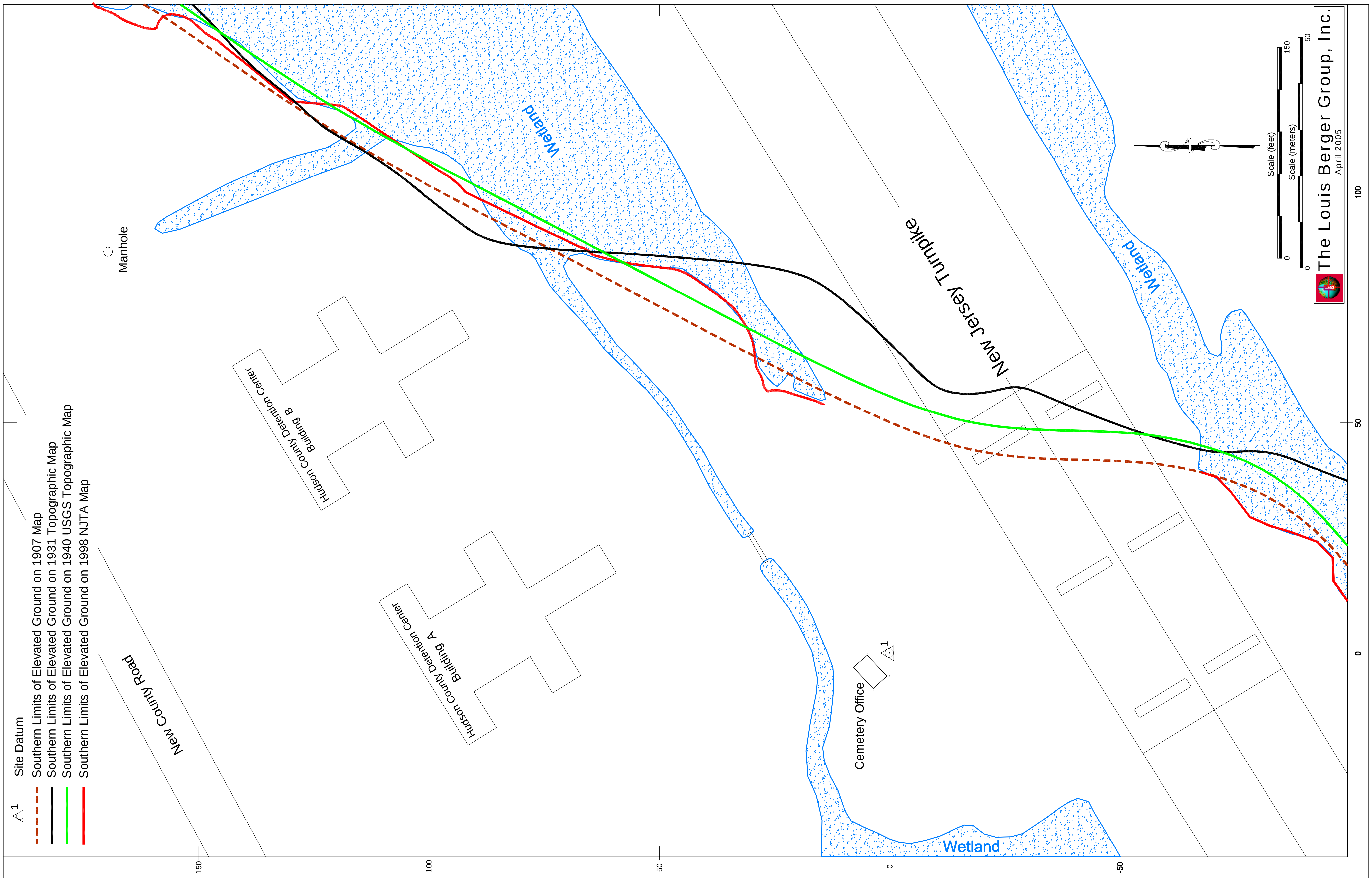


FIGURE 7-2: Locations of the Southern Boundary of Elevated Ground from Available Maps

All of these maps contributed to Berger's understanding of the location of the boundaries of Potter's Field, and the approximate locations of many graves. Figure 7-3 shows several portions of Potter's Field shown on available historic maps. Unfortunately, none of these maps depicted Potter's Field to be as extensive as Berger's excavations subsequently revealed. Each of the three maps, Map No. 769, Map No. 1188, and Map No. 1188 Addenda represent only portions of the Potter's Field burial ground. The six or seven years between each survey conducted for the burial ground appear to be the result of sporadic attempts to document its location based on misunderstandings of its long history of use.

Berger's assessment of maps 769, 1188, and 1188 Addenda suggest that Potter's Field should have contained at least 1,377 graves containing 3,242 burials – 177 more graves and 258 fewer burials than the Turnpike's initial estimates. Berger also considered the possibility that these maps provided only a reliable beginning date for interments in Potters Field and that the burial ground may have been used for all interments listed in the Burial Registers after May 13, 1916. If this interpretation was correct, then the number of graves expected would be 1,683 containing 4,051 burials – 483 more graves and 551 more burials.

As previously discussed, the 1907 map (see Figure 4-8) depicted three "burial grounds" including an eastern burial ground mapped at the location of the current project area referred to as Potter's Field. Berger initially assumed that the existence of two other burial grounds to the west and closer to the Hudson County Institutional Complex was sufficient evidence to presume that some of the earlier, pre-1916 burials not indicated on maps 769, 1188, and 1188 Addenda would have been interred in one of the other burial grounds. However, the depiction of the easternmost burial ground (Potter's Field) on the 1907 map suggested that the project area may have been in use as a burial ground well before 1916. As such, Berger suspected that not only was the Turnpike's estimate of the number of graves and interments certainly low but also those estimates derived during Berger's initial research.

Table 7-1 summarizes, by year, the number of burials and graves entered in the Burial Register between December 31, 1880 and April 13, 1962. Table 7-1 also indicates the average number of burials per grave calculated from the Burial Register data. Berger considered these data as indicative of the "worst case scenario" if Potter's Field contained all the burials listed in the Hudson County Burial Registers.

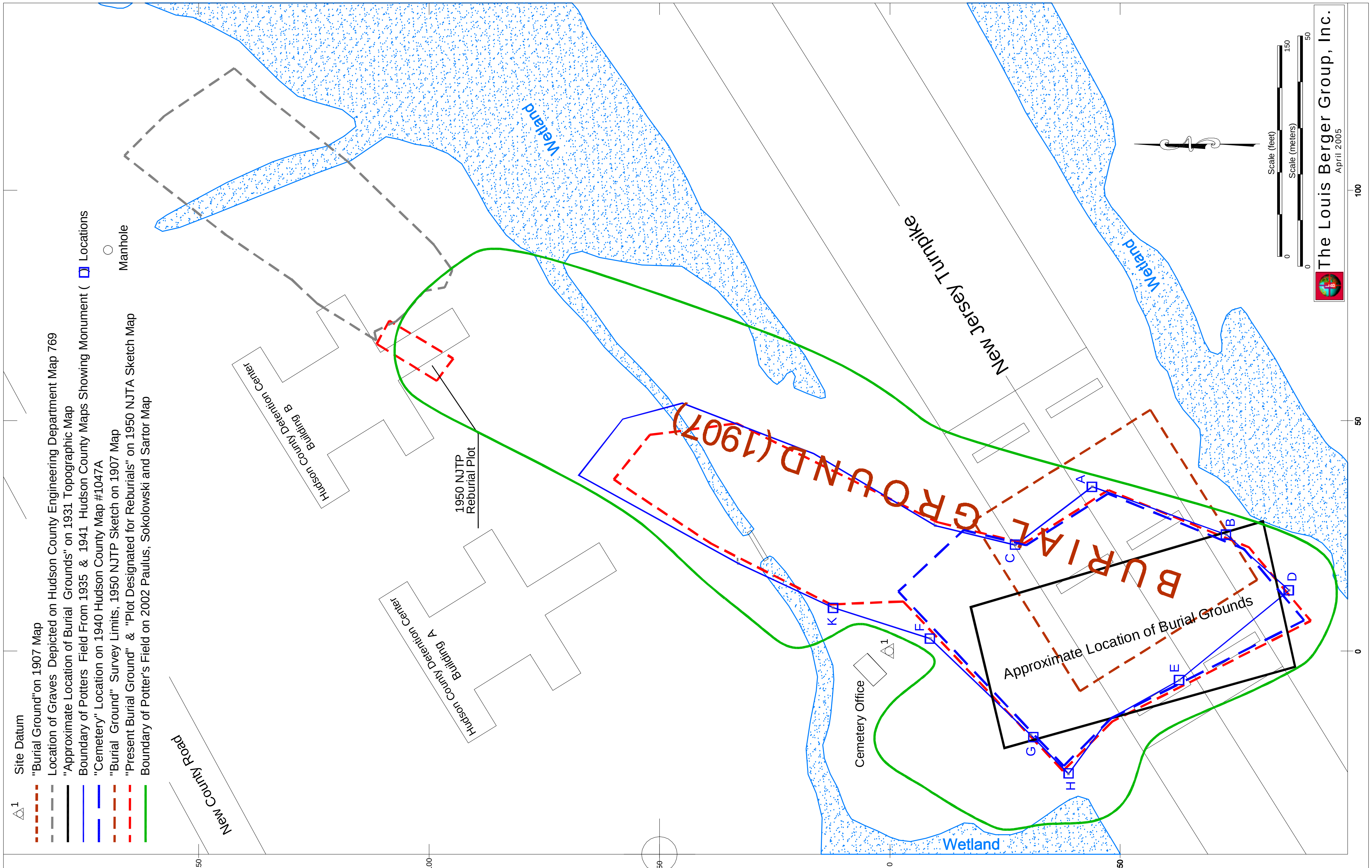


FIGURE 7-3: Portions of Potter's Field Shown on Available Maps

TABLE 7-1

BURIAL STATISTICS AND BERGER MATCHES BY YEAR AND MAP

UNMAPPED BEFORE 5/13/1916

Mo	Day	Year	Burials	Graves	Burials/Grave	Matches
12	31	1880	1	1	1.00	
		1881	126	126	1.00	
		1882	170	168	1.01	
		1883	119	118	1.01	
		1884	118	116	1.02	
		1885	153	144	1.06	
		1886	141	130	1.08	
		1887	165	145	1.14	
		1888	139	122	1.14	
		1889	168	157	1.07	
		1890	177	161	1.10	
		1891	202	202	1.00	
		1892	211	193	1.09	
		1893	171	146	1.17	
		1894	166	126	1.32	
		1895	155	113	1.37	3
		1896	177	128	1.38	2
		1897	179	126	1.42	6
		1898	157	138	1.14	1
		1899	131	106	1.24	2
		1900	162	130	1.25	
		1901	191	99	1.93	2
		1902	228	132	1.73	4
		1903	147	58	2.53	6
		1904	202	90	2.24	8
		1905	171	80	2.14	22
		1906	136	61	2.23	4
		1907	115	52	2.21	5
		1908	136	60	2.27	6
		1909	128	60	2.13	4
		1910	161	75	2.15	18
		1911	173	73	2.37	17
		1912	156	66	2.36	7
		1913	175	76	2.30	35
		1914	167	73	2.29	6
		1915	172	72	2.39	21
5	12	1916	81	37	2.26	3
		Totals	5725	3958	1.45	182

TABLE 7-1 (continued)

MAP No. 769

Mo	Day	Year	Burials	Graves	Burials/Grave	Matches
5	13	1916	156	66	2.32	61
		1917	270	110	2.45	89
		1918	211	90	2.34	44
		1919	140	60	2.33	48
		1920	113	46	2.46	76
		1921	83	37	2.24	68
		1922	89	42	2.12	76
3	10	1923	10	5	2.00	8
		Totals	1072	456	2.34	470

MAP No. 1188

Mo	Day	Year	Burials	Graves	Burials/Grave	Matches
3	13	1923	76	33	2.30	9
		1924	120	56	2.14	23
		1925	118	50	2.36	14
		1926	141	56	2.52	15
		1927	119	49	2.43	12
		1928	119	48	2.48	23
		1929	127	60	2.12	12
		1930	133	50	2.66	21
		1931	145	57	2.54	17
		1932	147	58	2.53	6
		1933	150	67	2.24	6
		1934	126	56	2.25	3
4	11	1935	33	14	2.36	
		Totals	1554	654	2.38	161

MAP No. 1188 ADDENDA

Mo	Day	Year	Burials	Graves	Burials/Grave	Matches
4	16	1935	75	32	2.34	
		1936	97	43	2.26	
		1937	97	43	2.26	4
		1938	90	40	2.25	
		1939	85	36	2.36	6
		1940	92	38	2.42	
12	18	1941	80	35	2.29	
		Totals	616	267	2.31	10

TABLE 7-1 (continued)

UNMAPPED AFTER 12/18/1941						
Mo	Day	Year	Burials	Graves	Burials/Grave	Matches
12	20	1941	6	3	2.00	
		1942	86	37	2.32	
		1943	68	28	2.43	
		1944	64	26	2.46	
		1945	64	24	2.67	
		1946	51	18	2.83	
		1947	57	19	3.00	
		1948	43	18	2.39	1
		1949	44	19	2.32	1
		1950	46	16	2.88	
		1951	45	17	2.65	
		1952	48	18	2.67	
		1953	38	12	3.17	
		1954	45	17	2.65	
		1955	34	8	4.25	
		1956	19	6	3.17	
		1957	11	3	3.67	
		1958	14	5	2.80	
		1959	10	4	2.50	
		1960	10	3	3.33	
		1961	8	1	8.00	
4	13	1962	1	2	0.50	
		Totals	812	304	2.67	2
		Grand Total	9781	5641		825

C. MODIFICATION AND USE OF THE PROJECT AREA BY BERGER

The Potter's Field project area had undergone substantial changes both during its use as a burial ground and since the abandonment of the burial grounds in 1962. These changes had eliminated all evidence of the burial ground and had resulted in damage and displacement of many burials. Changes resulted from general neglect of the burial ground throughout its use as evidenced by the comment concerning brush fires and deterioration on Map No. 769, deterioration of grave boards, removal and/or displacement of wood and cement/ceramic grave markers, construction of the New Jersey Turnpike, overgrowth of secondary vegetation, land filling, construction of drainage ditches, construction of foundations for a large billboard, and construction of a detention center. In order to effectively identify the burial ground and disinter all burials contained within its boundaries, the Berger team had to, in effect, undo or quantify as many of these changes as possible. It was, of course, not possible to replace deteriorated grave boards and displaced cement/ceramic grave markers; nor was it possible to reverse the impacts of the excavations undertaken to construct ditches and emplacement of foundations for the detention center and its security fences. But other changes and modifications to the project area could be, at least partially undone. Figure 7-4 illustrates some of the intrusive features constructed over the former burial ground and the modifications to the project area made by Berger during the project.

Berger's tasks included removal of vegetation, debris and imported fill, as well as structural features while attempting to quantify the effects of these landscape modifications on the burial ground through

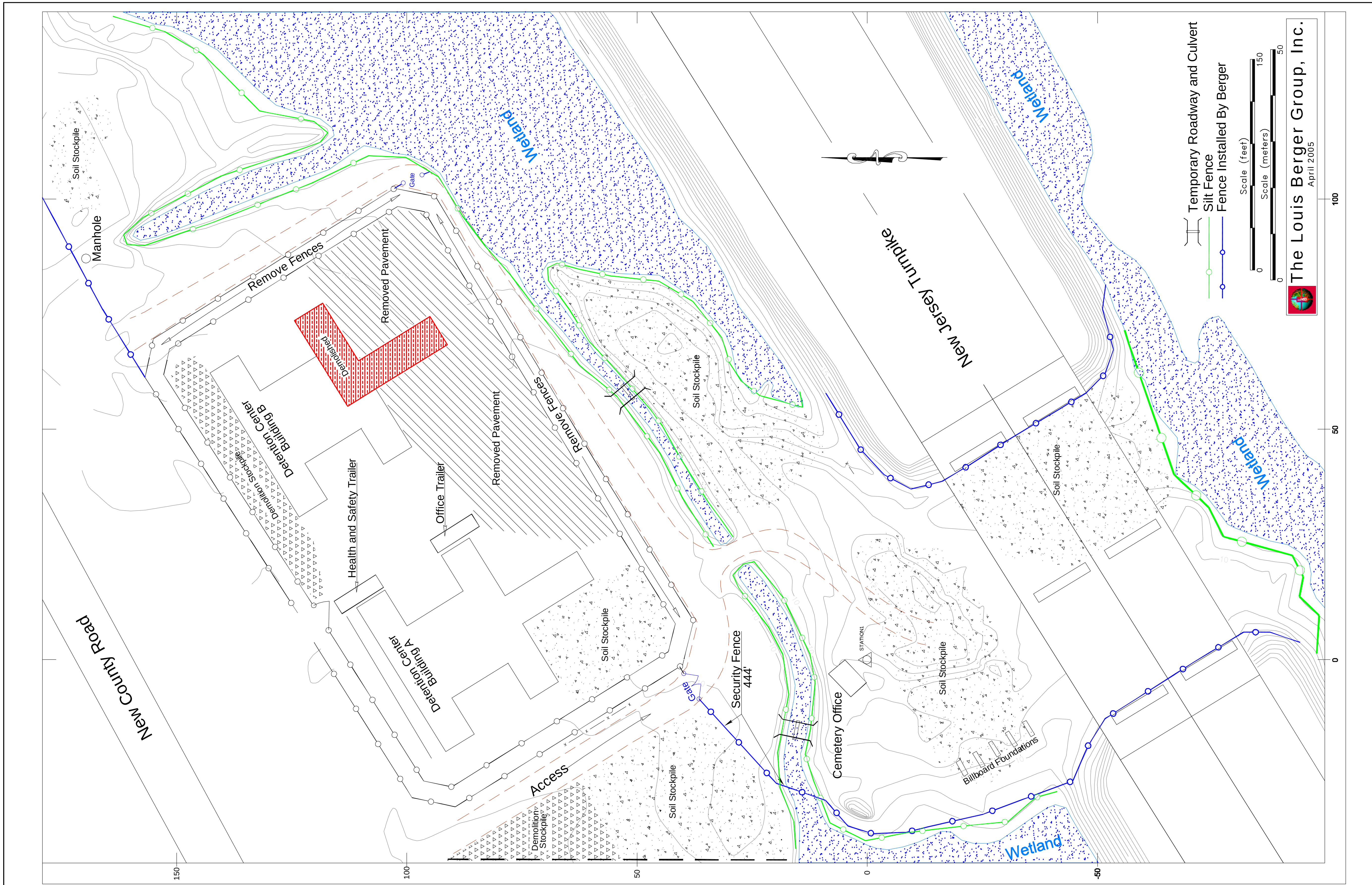


FIGURE 7-4: Modifications and Use of the Project Area by Berger

detailed mapping and continuous observation and recording of soil characteristics and evidence of disturbance throughout the project area. In addition, the horizontal locations and depths of the several man-made drainage ditches traversing the burial ground also were precisely mapped. Moreover, although the effects of the Turnpike's construction on the burial ground including the removal and reburial of several burials were well documented during the 1950s, it was unclear what effect the relocation of graves had on previously interred burials that may have been located within the Turnpike's reburial area. Furthermore, given the inadequate mapping of grave locations and general boundaries throughout the history of the burial ground, Berger was mindful of the possibility that the Turnpike's road bed and supporting earthen berm may have inadvertently covered small, unquantifiable portions of Potter's Field.

Two of the most difficult removal/demoliton tasks faced by Berger, were the removal of the billboard concrete footers and demolition of a portion of the detention center buildings. In late February-early March 2003, Berger and its contractor removed five concrete foundation blocks from the extreme western limits of the project area (Plates 7-1 thru 7-4). However, one of Berger's most challenging demolition task was the removal, and stockpiling of portions of the detention center including twin, 16-foot high steel fences and their foundations, asphalt and concrete paving, and portions of one of the two reinforced concrete and steel plate buildings (see Figure 7-4). These demolition tasks were ongoing; being undertaken when necessity dictated and time, personnel, and equipment were available (Plate 7-5). At the conclusion of the disinterment field effort, Berger also removed the cemetery office ensure that the building did not overly and had not affected any unknown or unmarked graves.

PLATE 7-1: Concrete Foundation Block from Billboard

PLATE 7-2: Removal of Billboard Foundation Blocks

PLATE 7-3: Excavation Around Concrete Foundations

PLATE 7-4: Inspection for Human Remains or Graves

PLATE 7-5: Demolition of a Portion of Building B

1. Access

Throughout the duration of the field effort, one of Berger's site management tasks involved maintaining access into the project area and maintaining access routes for pedestrian transit throughout the project area and for movement of heavy equipment. For more than a month, access to the project area was by way of an unpaved and usually very muddy dirt road. Out of necessity, this road was covered with gravel in early April and provided easy access throughout the rest of the field session.

Internal transit from place to place within the project area was a continuing problem exacerbated by the need to abandon routes previously painstakingly prepared to accommodate expanding disinterment activities and relocation of stockpile areas. Access to the southern portions of the burial ground necessitated crossing an east-west ditch that drained the wetlands and pond situated immediately west of the project area. Since continuous water flow had to be maintained through the ditch, new crossings required construction of temporary roadways and installation of culverts. Similarly, access to the northeastern portion of the project area required crossing a north-south ditch that also necessitated the construction of temporary roadways and installation of culverts to maintain water flow. As an additional complication, graves were found in the banks and under portions of both ditches and these burials had to be removed prior to any modifications to the ditches.

2. Security Fencing

Berger installed 348 meters (1,142 feet) of six-foot high cyclone security fences along portions of the project area's perimeter to restrict access routes into the project area. Direct access into the project area was accommodated through a chained and locked gate at the southwestern corner of the detention center.

3. Silt Fences, Pumping, and Filter Bags

Berger installed approximately 800 meters (2,625 feet) of silt fences to prevent discharge of runoff into the surrounding wetlands. In addition, all water pumped to provide access to grave contents and to dewater larger areas of the site was filtered through 10-foot by 6-foot filter bags before being discharged into the drainage ditches (Plates 7-6 and 7-7). Dewatering was a constant necessity and usually required 24-hour operation of several 2.5-inch pumps.

PLATE 7-6: Water Pumping

PLATE 7-7: Filtration Bag

4. Electricity and Heat

Much of the equipment utilized by the field teams including lighting, electrically operated screens, and fans required either 110 or 220 volt electrical power. For several months Berger supplied the minimal electrical needs with portable, gasoline-powered generators. In early April 2003, commercial electrical power was obtained and outdoor power was supplied to the field through weather resistant power panels installed at several outdoor locations across the site.

Heating was provided to both the interior of detention center Building A and to outdoor shelters by propane and kerosene fueled heaters. During the summer months, electric fans circulated air in the otherwise stiflingly hot shelters and detention center buildings.

D. LOCATING SECTION CORNER MONUMENTS

As discussed, Berger's initial understanding of the location and extent of Potter's Field was based entirely on maps and other documentary evidence provided by the Turnpike Authority and gleaned from other sources, most importantly, maps maintained by the Hudson County Engineering office. Further, there was considerable evidence for inconsistencies in the available maps compounded by later construction-related ground disturbances and land filling during and subsequent to the burial ground's use.

Determining whether the monuments marking section corners depicted on the maps of the Hudson County burial ground were extant was a principal goal during the early stage of survey and fieldwork. These monuments were important because of their anticipated usefulness in locating the historic boundaries of the southwestern portion of the burial ground and individual grave locations. To further complicate matters, there was no available data indicating what these monument markers were made of — wood, stone, or other material — and whether or not they would have been preserved *in situ* buried below the ground surface.

As such, finding Monument F was a priority because the Map No. 1188 depicted two measurements to the monument from the only remaining, mapped burial ground feature – the cemetery office. Monument F was depicted as being located 45.6 feet (13.9 meters) from the southeast corner of the cemetery office and 40.25 feet (12.27 meters) from the southwest corner of the cemetery office (see Figure 4-7).

To determine if a search for monuments might be fruitful, Berger pulled two tapes one 45.6 feet from the southeastern corner of the cemetery office and another 40.25 feet from the southwestern corner of the cemetery office and a pin flag was placed at their intersection. A 3x2-meter backhoe trench was then excavated centered on the pin flag. The backhoe exposed the top of a four-sided, rough-quarried stone (diabase), with each face or side measuring about 0.65 foot (20 centimeters). The top of the monument was discovered at 4.59 feet (1.4 meters) below the existing ground surface and directly below the pin flag (Plate 7-8). Further excavations revealed that the quarried stone monument was approximately 2.03 feet (62 centimeters) in height with its bottom at a depth of 6.63 feet (2.02 meters) below the ground surface. Based on its location and correlation to the historic maps of the burial ground, this marker was interpreted as Monument F.

PLATE 7-8: Discovery of Section Corner Monument F

Having successfully discovered one monument, the field survey attempted to locate a second monument in an effort to better orient the historic burial ground maps. Map No. 1188 Addenda (see Figure 4-12) included two measurements for the siting of Monument K. One measurement is 38.82 feet (11.83 meters) from the southeastern corner of the cemetery office to Monument K, while the second measurement is 71.65 feet (21.84 meters) between Monument F and Monument K. Employing the same methodology used for the discovery of Monument F (pulling two tapes and pin flagging the location), backhoe excavations were again utilized. At the presumed location of Monument K, a well-rounded igneous boulder approximately 1.64 feet (0.5 meters) in diameter was exposed. Discovery of a boulder and not a hand-shaped stone block similar to Monument F was perplexing, however, since the boulder was found at the precise predicted location of the corner of a later section of the burial ground, it is possible that an available, large boulder was used as a corner marker after the supply of original block markers was exhausted. Nevertheless, the discovery of Monument F and the known location of Monument K allowed field-marking of the locations of all mapped section corners and, thus, the mapped boundaries in the southwestern portion of Potter's Field.

Subsequent removal of overburden soils soon exposed three other, similar rough hand-quarried stone markers within 3.28 feet (1 meter) of the predicted locations of Monuments A, B, and C. A fifth, displaced and broken stone marker, was found at the northwestern edge of the project area near a large soil pile, approximately 82 feet (25 meters) from the mapped positions of Monuments G and H. It is presumed that this monument had been moved by previous construction activities and likely represented either Monument G or Monument H. In total, four stone section corner markers were found *in situ* at predicted monument locations. They included Monuments A, B, C, and F (Plates 7-9 and 7-10).

PLATE 7-9: Section Corner Monuments

Plate 7-10: Monument F

E. SCHEDULING

The Turnpike's construction schedule played a key role in determining where the archaeological fieldwork would begin. The Turnpike Authority planned to begin work in the project area by building detour lanes around the Turnpike bridge, followed by demolition of the bridge at the southernmost extent of the project area. Therefore, beginning and completing disinterment excavations under the bridge would allow construction crews access to the bridge and its immediate vicinity while Berger's team worked in other portions of the project area.

Fortunately, the Turnpike Authority's construction schedule was compatible with the exploratory nature of Berger's excavation strategy. As described above the excavation strategy was substantially based on archaeological discovery supplemented by available cartographic and documentary information. The process of discovery proceeds from what is known (with more or less certainty) into the unknown. The areas covered by and in the vicinity of the bridge were the best known in the burial grounds because all available maps except Map No. 769 depicted the location of at least portions of the burial ground in the vicinity of the bridge. Of critical importance was testing the reliability of the maps by discovering whether graves and corner markers on the 1188 maps were, indeed, at their mapped locations. For this reason, Berger intended, early on, to begin excavations in the southernmost portions of the project area — under or near the Turnpike's bridge (Plates 7-11 thru 7-14).

Additionally, beginning under the bridge gave survey, monitoring, and exhumation field crews the opportunity to begin work in the only area of the burial grounds protected from snowfall, freezing rain, and public view. This allowed the team members to concentrate on technical and logistical procedures without having to deal with the additional daily task of erecting and moving heavy and cumbersome shelters required to protect the grave shafts in open areas.

PLATE 7-11: Stripping Begins Under Turnpike Bridge

PLATE 7-12: Monitoring Team Under Bridge

PLATE 7-13: Excavations Under Bridge

PLATE 7-14: Disinterment Activities Under Bridge

F. EXCAVATIONS

Berger employed three excavation methodologies during the disinterment program at Potter's Field. *Exploratory excavations* focused directly on finding boundaries of the burial ground and determining whether graves were present in particular areas; *removal of imported soils and debris (overburden)* to locate graves and make them accessible; and *exhumation of human remains* and grave contents.

1. Exploratory Excavations

Berger completed twenty (20) mechanically excavated exploratory trenches to define the spatial limits of the burial ground, discover burial features (graves), expose the north-facing slope of the elevated landform on which the burial ground was historically situated, define areas that did not contain graves, and to identify and characterize disturbance(s) to the burial ground (Figure 7-5). Trenching, like all other excavations in the burial ground, removed soils in no greater than 0.1 meter (0.33 feet) increments and was carefully monitored to identify and minimize potential disturbance to burial features. The combined length of the exploratory trenches was 1,500 feet (457.3 meters) and resulted in exposure of approximately 0.31 acres (1,221.1 square meters) in plan view and approximately 20,451 square feet (1,900 square meters) of vertical profiles. Table 7-2 summarizes the length, area, purpose, and results of each exploratory trench, and lists any profile drawings prepared of trench sidewalls.

TABLE 7-2

TRENCH DIMENSIONS, PURPOSES, AND RESULTS

Trench	Length	M^2	Purpose	Results	Profile(s)
1	34.0	170.3	Burial Ground Boundary Definition	No Graves Found	
2	34.0	170.3	Burial Ground Boundary Definition	No Graves Found	
3	12.4	27.0	Presence of Graves	Graves Present	
4	12.4	29.0	Presence of Graves	Graves Present	
5	50.0	111.7	Burial Ground Boundary Definition	No Graves Found	
6	40.0	77.0	Burial Boundary Definition	Graves Present	
7	17.0	34.0	North Slope Exposure & Presence of Graves	Slope Exposed, No Graves Found	
8	11.5	33.9	Presence of Graves	No Graves Found	
9	16.0	37.0	Presence of Graves	Graves Present	
10	29.0	64.5	Presence of Graves	Graves Present	
11	11.0	23.5	North Slope Exposure & Presence of Graves	Slope Exposed, No Graves Found	
12	22.0	70.3	North Slope Exposure & Presence of Graves	No Slope, No Graves Found	
13	7.0	15.2	North Slope Exposure & Presence of Graves	No Slope, No Graves Found	
14	9.0	17.2	North Slope Exposure & Presence of Graves	No Slope, No Graves Found	
15	48.0	128.5	North Slope Exposure & Presence of Graves	Slope Exposed, No Graves Found	6 & 7
16	25.0	52.3	North Slope Exposure & Presence of Graves	Slope Exposed, No Graves Found	
17	25.0	49.2	North Slope Exposure & Presence of Graves	Slope Exposed, No Graves Found	
18	7.0	13.1	North Slope Exposure & Presence of Graves	Slope Exposed, No Graves Found	
19	27.0	68.8	North Slope Exposure & Presence of Graves	Slope Exposed, No Graves Found	
20	20.0	59.3	North Slope Exposure & Presence of Graves	No Slope, No Graves Found	
	457.3	1252.1	=ca. 3000 cubic yards		

a. Exploratory Trenches 1 and 2

Archaeological excavations began under the bridge on in February 2003. Central support piers divided the area beneath the bridge into two large bays – east and west - each measuring 95 x 121 feet (29 x 37-meters). Excavations began with exploratory trenching in the east bay in an attempt to discover graves at the southeast edge of the burial ground as depicted on Map No. 1188 and to clear an area for stockpiling soils. An initial 16.4-foot (5.0 meter) wide trench, Exploratory Trench 1, was mechanically excavated in a north-south orientation parallel and adjacent to the eastern bridge piers. Soils were removed to subsoil at a maximum depth of 4.92 feet (1.5 meters). The trench exposed an upper layer of fill that varied in thickness between 1.64 feet (0.5 meters) and 3.61 feet (1.1 meters) underlain by reddish brown sandy silt with water rounded pebbles and cobbles. The ground was frozen to a depth of approximately one foot (0.30 meters) and the water table was encountered at approximately 4.92 feet (1.5 meters) below the

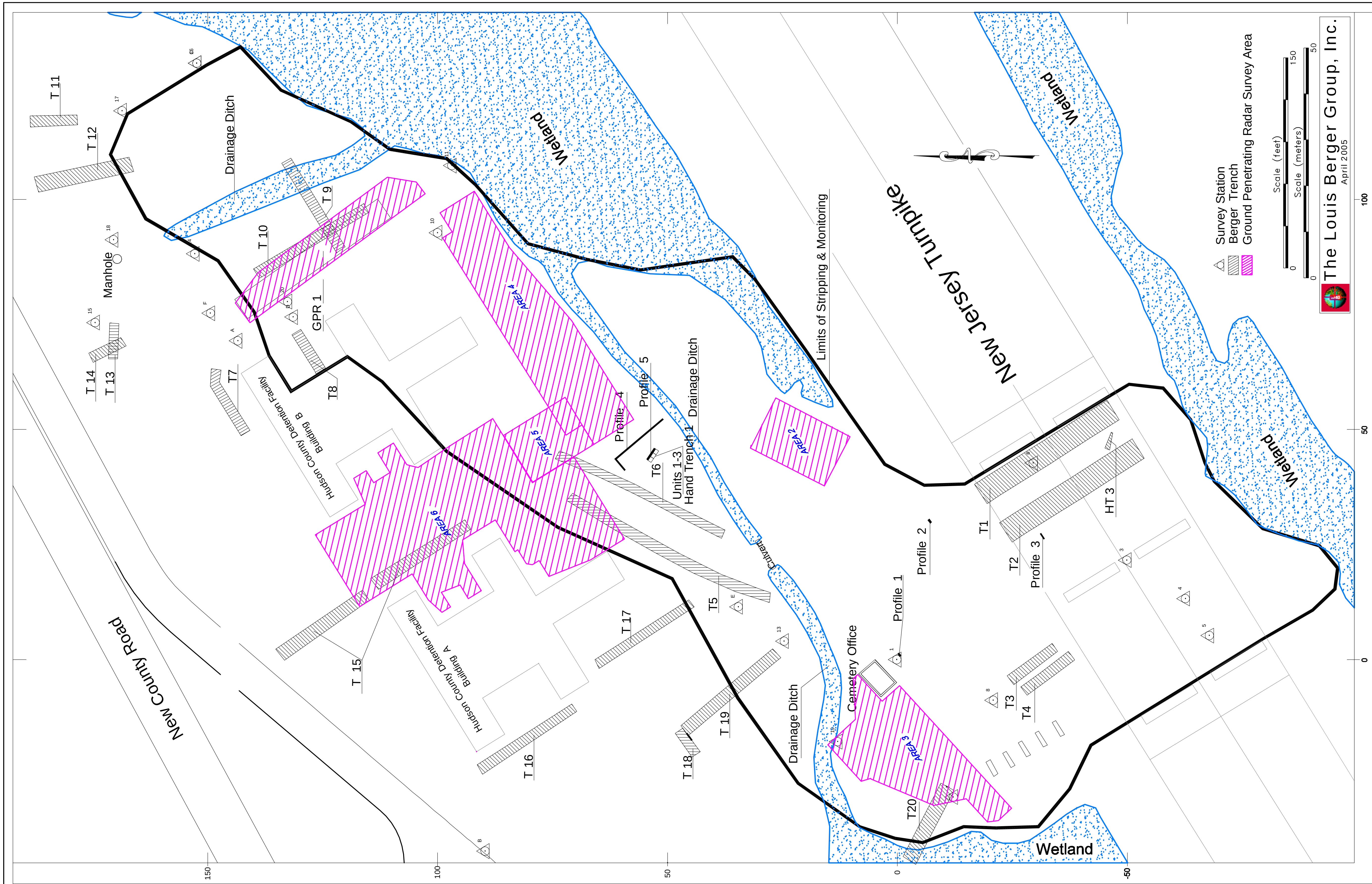


FIGURE 7-5: Locations of Exploratory Excavations, Stripped Area, Profiles, and GPR Survey Areas

surface. Exploratory Trench 1 did not extend below the water table. No evidence of graves, coffins, bones, or other cultural material was found in the trench.

A second trench, Exploratory Trench 2, was excavated in the east bay five meters west of and parallel to Exploratory Trench 1. Exploratory Trench 2 was also 16.4 feet (5.0 meters) wide and extended between the southern and the northern edges of the bridge. The trench exposed fill extending from the ground surface to depths varying from 2.46 feet (0.75 meters) to about 3.28 feet (1.0 meter). Trenching extended into the subsoil no deeper than the water table at approximately 4.92 feet (1.5 meters) (Plate 7-15). No features, skeletal material or artifacts were found in Exploratory Trench 2.


PLATE 7-15: Excavation of Exploratory Trench 2

b. Exploratory Trenches 3 and 4

Two exploratory trenches, Trenches 3 and 4, were excavated by the backhoe immediately north of the west bay of the bridge where historic maps suggested graves were concentrated (Plate 7-16). Removal of fill from both trenches exposed soil anomalies approximately 4.27 feet (1.3 meters) below ground surface that appeared to be pit features containing dark brown gravelly silt surrounded by yellowish brown loamy subsoil. These characteristics were consistent with Berger's expectations for initial evidence of the presence of graves. Berger's Field Archaeologists/Technicians then began hand excavations at one of the anomalies which quickly exposed a human femur. Designated Burial 1A, this find confirmed that at least remnants of the burial ground existed beneath the fill layer. A 12x8-meter area around Burial 1A was then stripped of overburden fill soils, and covered by a portable shelter. Soil stripping proceeded southward from this first shelter into the west bay until all fill materials had been removed from the bay. The stripping exposed a dense and orderly array of graves throughout the west bay.

PLATE 7-16: Exploratory Trench 4

c. Exploratory Trench 5

A tracked excavator was utilized to complete Exploratory Trench 5 which was positioned in an attempt to find evidence for the northern boundary of the burial ground south of the detention center. The 164 –foot (50 meters) long trench was excavated at Berger's estimated location for the northern limits of the burial ground. Exploratory Trench 5 exposed fill overlying reddish brown sandy silt with water rounded pebbles and cobbles that was interpreted as native subsoil. No burial features were exposed in Exploratory Trench 5.

d. Exploratory Trench 6

Exploratory Trench 6 was also dug by an excavator approximately 19.69 feet (6.0 meters) south of and parallel to Exploratory Trench 5 in a second attempt to find the northern boundary of the burial ground. The roughly 131-foot (40 meter) long trench exposed fragmentary human skeletal material scattered throughout fill overlying the same subsoil evidenced in Exploratory Trench 5. At the boundary between the fill and the subsoil, ten partial *in situ,* clusters of fragmented human remains were found that appeared to be within almost imperceptible pit features. The condition of the remains and the hard to define pit outlines suggested that the area had been mechanically graded removing all but the very lowest portions of graves. The fragmentary remains found above the subsoil were interpreted as the result of grading and mixing of original burial ground soils and the human remains they contained. The *in situ* remains were tentatively interpreted as the very bottoms of graves that had been truncated and fragmented by mechanized earth-moving equipment.

As the soils removed from Exploratory Trench 6 contained fragmentary human remains, they were stockpiled adjacent to the trench for subsequent screening. In addition, the discovery of human skeletal material in the displaced overburden made necessary the stockpiling and screening of all stripped soils between Exploratory Trench 6 and the adjacent drainage ditch.

e. Exploratory Trenches 7 and 11 through 20

Berger completed eleven additional trenches (Exploratory Trenches 7 and 11 through 20) in an effort to expose the north-facing slope of the once elevated burial ground landform and to determine whether burials had been interred outside the apparent boundaries of the burial ground. The trenches were of various dimensions and orientations though most were oriented in a northwest-southeast alignment, perpendicular to the long axis of the burial ground.

Exploratory Trench 7 was excavated north of the northeast corner of the eastern detention center building between the building and security fence. The trench was dug to determine whether graves were present in that area. Though no graves were found, the trench exposed a buried, north-sloping surface below 4.92 feet (1.5 meters) of overburden fill. The buried surface was interpreted as the surface of the north slope of the landform on which the burial ground was originally situated. The discovery of the sloping surface in Exploratory Trench 7 was encouraging as it was anticipated that the boundaries of the buried landform could be defined through further excavations. As a result, Exploratory Trenches 11 through 20 were excavated primarily to find the northern slope of the landform. By defining the northern slope of the buried landform, Berger was able to delimit the possible northern boundary of Potter's Field beyond which burials were very unlikely.

f. Exploratory Trench 8

Exploratory Trench 8 was excavated to determine whether graves were present adjacent to and east of Building B of the detention center (Plate 7-17). The 37.73-foot (11.5 meter) long east-west trench encountered very compact fill from the surface to a depth of about one foot (0.3 meters) below the surface. Yellowish brown loamy subsoil was exposed below the fill layer and extended to a depth of approximately 3.28 feet (1.0 meter) below the ground surface. No evidence of graves was revealed during excavation of Exploratory Trench 8.

g. Exploratory Trench 9

Exploratory Trench 9 was excavated between the eastern detention center perimeter fence and a point about 75 feet (22.8 meters) east of the fence in order to determine if graves were present east of the detention center. Trench excavations extended through portions of the northwest trending drainage ditch. Surface and near-surface soils west of the ditch were very compact. Soils east of the ditch were un-compacted fill and supported a dense secondary growth of shrubs and trees. Exploratory Trench 9 revealed grave shafts at approximately 1.6 feet (0.5 meters) below the ground surface west of the bank of the ditch. The skeletal materials found in the graves were incomplete and appeared to have been truncated by mechanized earth-moving equipment. Truncated graves were also found in both banks of the ditch and in the bottom of the ditch below the water surface. Exploratory Trench 9 demonstrated that the burial ground extended eastward beyond the limits of the detention center for an unknown distance.

PLATE 7-17: Exploratory Trench 8 Adjacent to Building

h. Exploratory Trench 10

Exploratory Trench 10 was excavated perpendicular to Exploratory Trench 9 to determine if burials were present north and south of those discovered in Exploratory Trench 9. Truncated graves were exposed in Exploratory Trench 10 in a very compact soil matrix to a distance 19.69 feet (6.0 meters) north of the north edge of Exploratory Trench 9. The skeletal material exposed north of Exploratory Trench 9 was very fragmented and appeared to have been scraped and crushed by heavy equipment. The northernmost remains in Exploratory Trench 10 were exposed within 2-inches (0.05 meters) from the surface. Subsequent exhumations of the remains in the northern end of Exploratory Trench 10 revealed that the remains consisted of only the crushed lower portions of the lowest burials in graves and that the upper portions of these lower burials and any overlying burials had been removed (truncated) by previous grading. Moving southward in Exploratory Trench 10, the skeletal material were found at progressively greater depths from the ground surface and the lower portions of these graves were more complete and less disturbed. These findings suggested that the burials discovered in Exploratory Trench 10 had been interred on the southeast-facing slope of the original landform.

In sum, exploratory trenching contributed substantially to Berger's understanding of boundaries beyond which burials were not likely by verifying the configuration of the high ground on which the burial ground was originally situated. Trenching also provided numerous profiles which by careful examination contributed greatly to Berger's understanding of the depositional history of the burial ground both during its use and subsequently.

i. Stratigraphy

Profiles 1, 2, and 3 (Figures 7-6, 7-7, and 7-8) were prepared from vertical exposure cuts to reveal the general stratigraphy of the burial ground. The degree to which the modified surface recapitulated the original surface was unclear, but estimates of the depth and extent of fill were arrived at by reference to various soil profiles. In Soil Profile 1 the interface between Stratum C and Stratum D is interpreted as the original burial ground surface based on soil types and the position of strata relative to the grave shafts seen in cross-section (Plate 7-18). Stratum C is described as reddish brown silty loam containing 15 percent broken stone and gravel. The angular, sheared nature of the inclusions characterizes the stratum as fill. Stratum D is an *in situ* brown silty sand. The sandy matrix and reddish color attest to a moderately well-drained soil. Soils formed in excessively wet environments tend to be grayish or have grayish mottling, reflecting the reduction of iron.

Soil Profile 2 also depicts a cross-section of two burial shafts, No. 951 and No. 11,197 which represent interments from the upper and the lower burial surfaces, respectively (Plate 7-19). The upper shaft was placed almost directly over the lower shaft, truncating it and leaving only the bottom of the lower shaft intact. The outline of Burial Shaft No. 951 cuts through Stratum C, but does not truncate either Stratum A or B, indicating that the two upper soil horizons post-date the origin of the shaft and were imported to accommodate additional burials. The interface of Stratum B and Stratum C is thus interpreted as the surface grade at the time when Burial Shaft No. 951 was excavated for interments. An ash lens caps the shaft and may represent regular disposal of stove ash from the cemetery office in areas of slumping grave shafts.

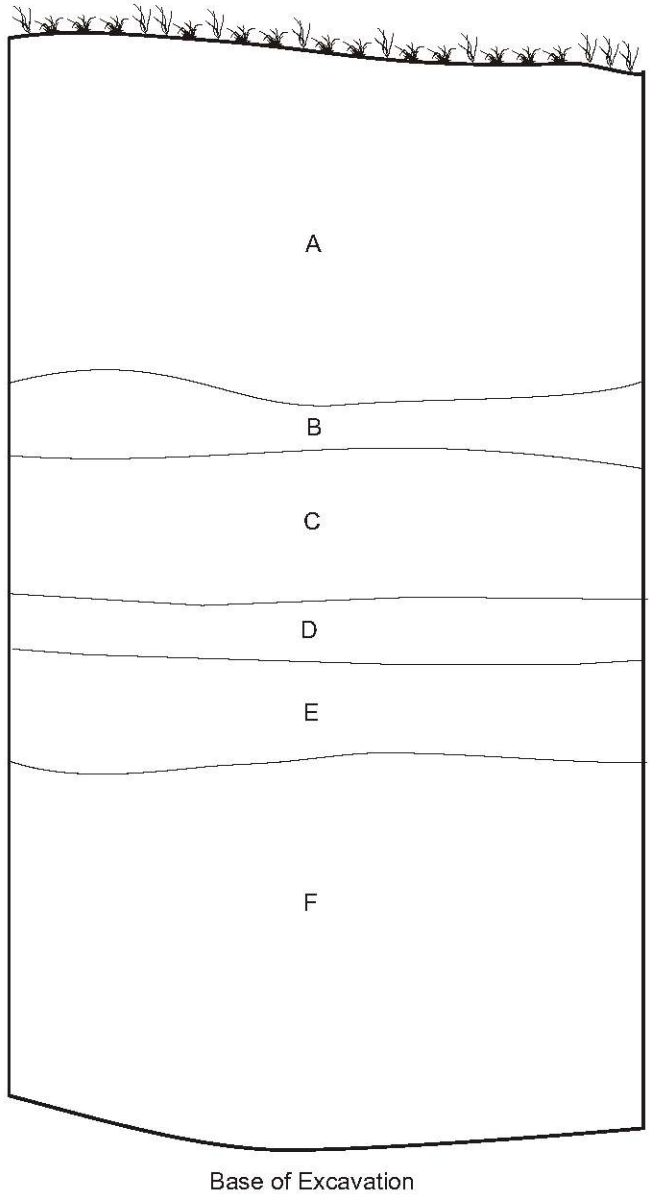
Stripping in the area between Exploratory Trench 6 and the drainage ditch exposed apparent, truncated, *in situ* burial features. The disturbed stratigraphy in this area was very difficult to interpret during the normal course of monitoring and the poor condition of the graves in the area made it very difficult to discern *in situ* soils from disturbed overburden/fill. In an attempt to quantify the extent of the damage and to, perhaps, determine whether the damage was the result of construction of the ditch and/or the detention center, Berger temporarily stopped the stripping operations at a line between the ditch and a point approximately 9.84 feet (3.0 meters) south of Exploratory Trench 6. This exposed a 46-foot (14 meter) long profile, Soil Profile 4 from the ground surface well into the subsoil (Plate 7-20 and Figure 7-9). Exposed in the profile were upper strata evidencing episodic filling that averaged more than three feet (one meter) in depth and contained human bone fragments, clothing fragments, and coffin wood. Underlying these strata was a truncated, southeast sloping, *in situ* subsoil.

Observations of Profile 4 and information derived from stripped and monitored areas to the southwest suggest that all the graves found in the areas between the trench and the drainage ditch had been substantially disturbed and that many graves had been completely obliterated. The scattered human bone and artifacts found in the soil column above the subsoil suggested that the skeletal and artifact contents of these graves had been intermixed with the displaced soils and re-deposited as fill.

Assuming that the strata C/D interface represents the original burial ground surface grade and that the strata B/C interface is the latter surface grade, Stratum C is interpreted as fill deposited over the first burial surface circa 1923. At this location the blanket of fill was rather shallow, measuring only about 18.5-inches (47 centimeters) thick, and may account for the deformation of Shaft No. 11,197 by Shaft No. 951. Judging from soil profiles taken elsewhere within the project area, however, the thickness of the circa-1923 fill is highly variable across the burial ground. Measuring 49.21 inches (125 centimeters) in thickness near the center of the burial ground the fill thinned to only about 2 to 3 inches (6 to 8

PLATE 7-18: Soil Profile 1

PLATE 7-19: Soil Profile 2



A. Strong brown (7.5YR 4/6) compact silty loam, 10-15% gravel and cobbles (Modern fill)
B. Very dark grayish brown (10YR 3/2) sandy loam, with ash, cinders and brick fragments (Historic fill)
C. Brown (10YR 4/3) <5% gravel (Ap-horizon)
D. Yellowish brown (10YR 5/4) silty loam, <5% gravel (E-horizon)
E. Yellowish brown (10YR 5/6) silty loam <5% gravel (B-horizon)
F. Yellowish brown (10YR 5/8) silty clayey loam mottled with light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/6), <5% gravel (Bt-horizon)

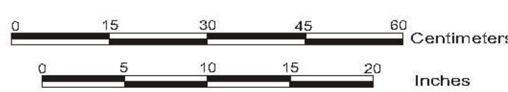
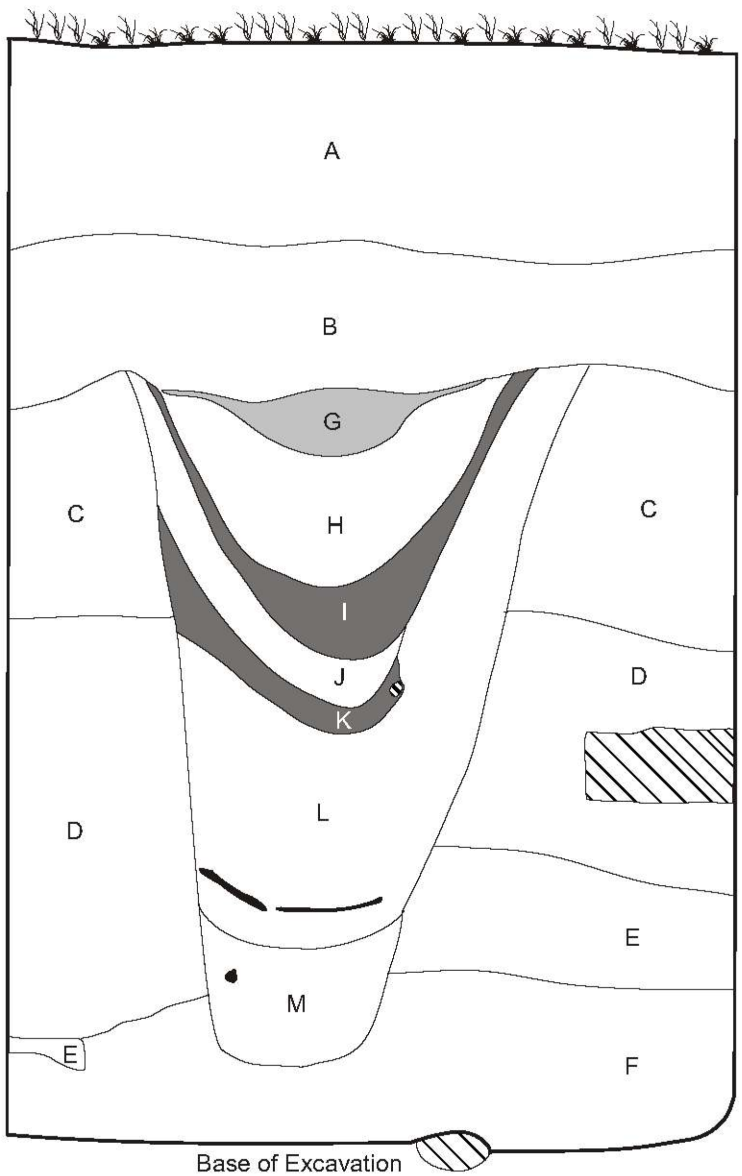


FIGURE 7-6: Soil Profile 1, View to North



A. Brown (10YR 4/3) silty loam, 5% gravel (Modern fill)
B. Dark brown (7.5YR 3/2) silty loam, 5% gravel (Modern fill)
C. Reddish brown (5YR 4/4 silty loam, 15% gravel and angular rock (Historic fill)
D. Brown (7.5YR 4/4) silty sand (A-horizon)
E. Dark reddish gray (5YR 4/2) rounded gravel (C-horizon)
F. Brown (7.5YR 4/4) compacted silty clay, 40-50% sandstone (B/C-horizon)
G. Ash and cinders
H. Dark reddish brown (5YR 3/2) silty loam, 5% gravel (Shaft No. 951 fill)
I. Black (7.5YR 2.5/1) silty sand, 2% gravel (Shaft No. 951 fill)
J. Dark reddish brown (5YR 3/2) silty loam, 5% gravel (Shaft No. 951 fill)
K. Reddish brown (5YR 4/3) silty loam, 8% gravel (Shaft No. 951 fill)
L. Reddish brown (5YR 4/3) silty loam, 5% gravel (Shaft No. 951 fill)
M. Reddish brown (5YR 4/4) silty loam, 10% gravel (Shaft No. 11,197 fill)

Rock
Bone

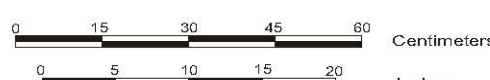


FIGURE 7-7: Soil Profile 2, View to South

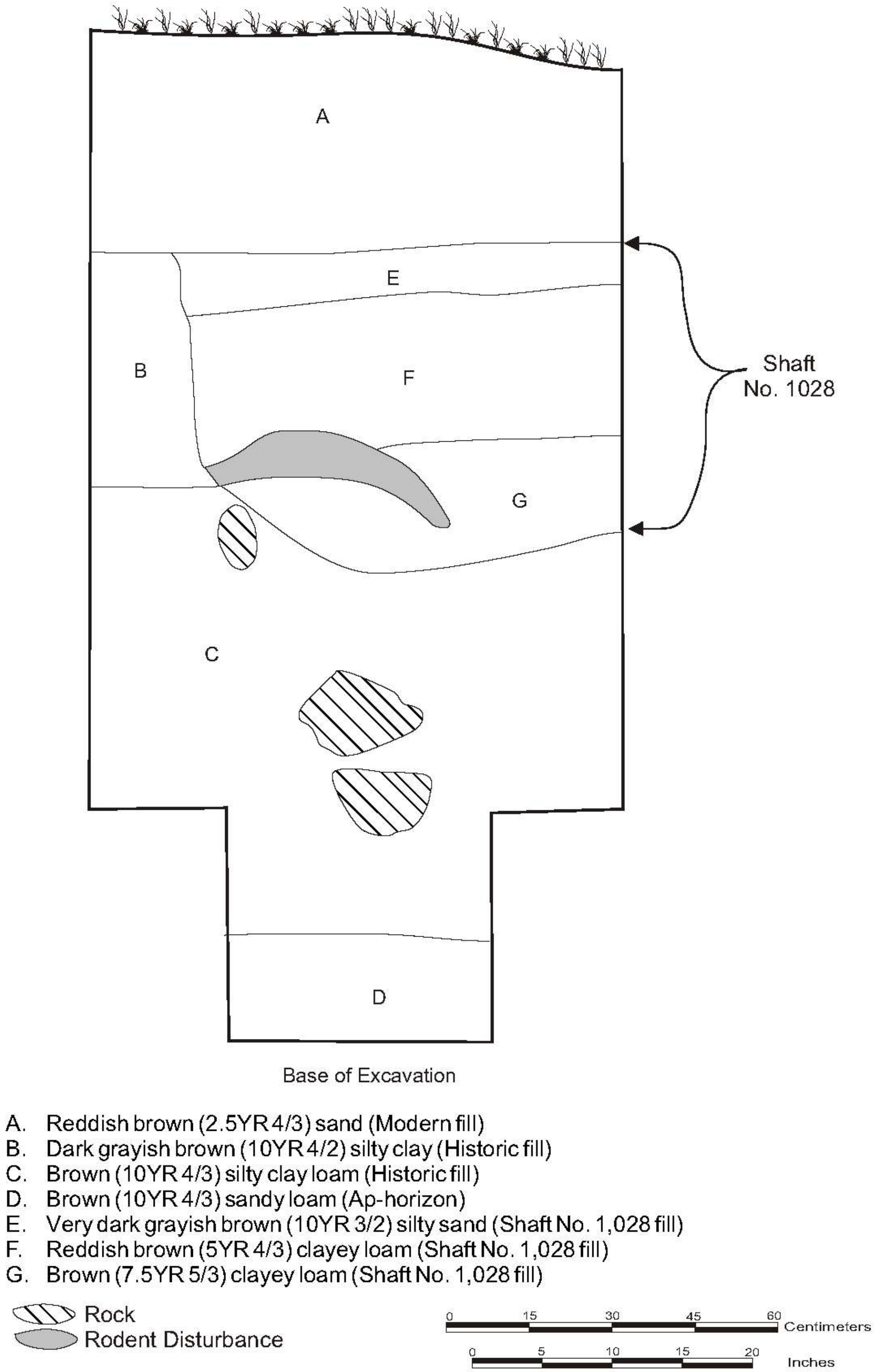


FIGURE 7-8: Soil Profile 3, View to South

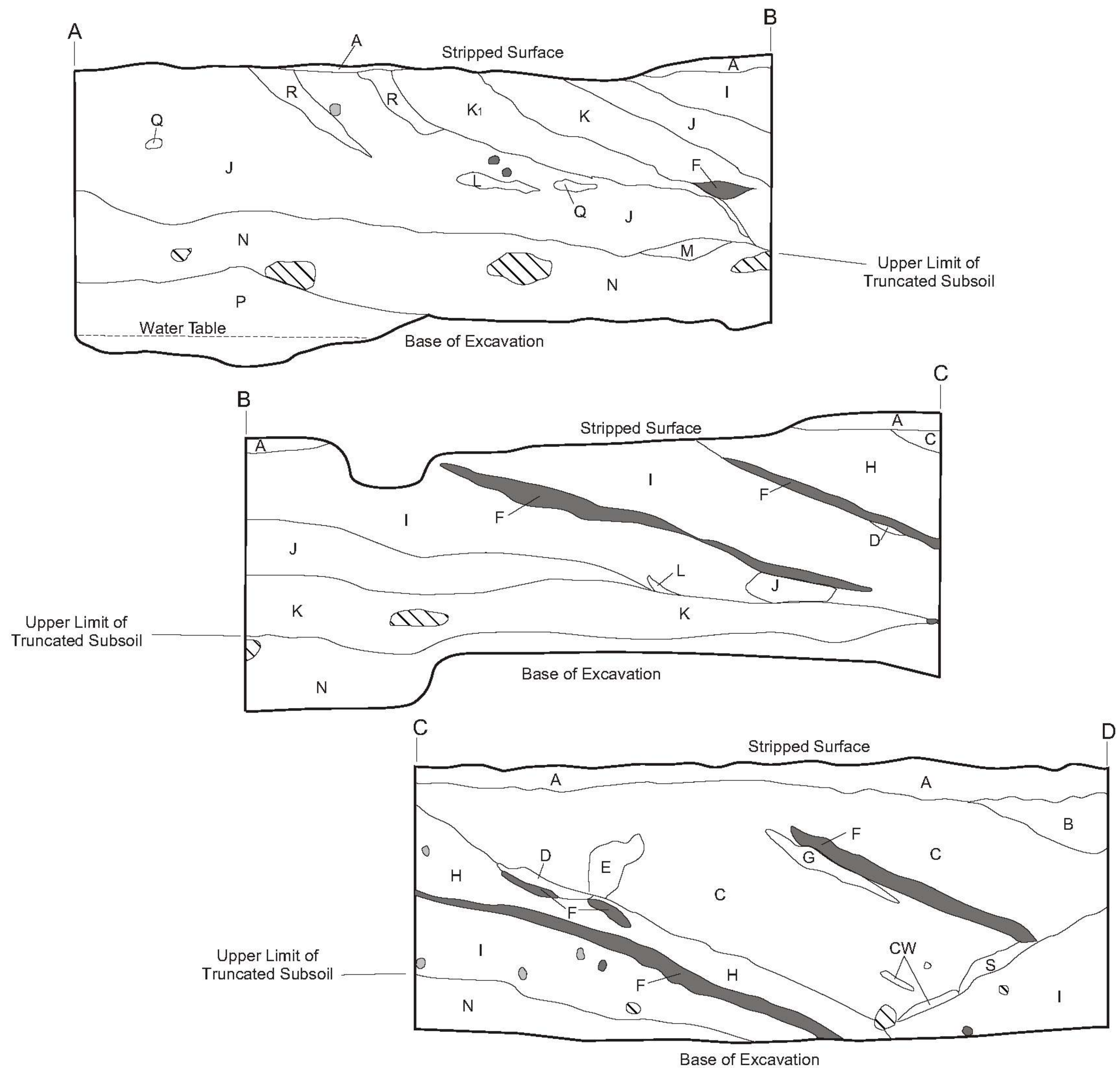
PLATE 7-20: Soil Profile 4

centimeters) at the northern edge of the burial ground in the vicinity of the cemetery office. The fill layers in both Profile 1 and Profile 3 rest on top of brown sandy loam, interpreted as the Ap-horizon, or original surface layer, when burial activities began circa 1880. This layer can be characterized as a plowzone, created by prior farming activities. The absence of a plowzone-like surface layer in Profile 2 may be explained by its location on the south-facing slope of the original landform, an area too steep for agriculture.

Initial efforts to remove overburden in the area between Exploratory Trench 6 and the drainage ditch to the south exposed scattered human bone throughout the imported and displaced fill and several additional clusters of fragmented bone. The removed soils were stockpiled for later screening. In order to more carefully examine and document the context of the displaced bone fragments in this area and to determine whether the bone clusters were, in fact, *in situ* graves, Berger's team members hand-excavated three 3x3-foot (1x1meter) controlled excavation units. These three units (Units 1, 2, and 3) were laid out adjacent to one another and taken together were designated Hand Trench 1 (Figure 7-10). Hand Trench 1 was oriented perpendicular to the slope of the original surface of the burial ground. The units were excavated concurrently in 0.66 –foot (0.20 meter) levels and cultural materials (artifacts and bone fragments) were collected by unit and level. Excavators encountered two upper strata (A and B) of displaced soils containing 79 human bone fragments and 123 artifacts to a maximum depth of about two feet (0.60 meters). Strata C and D were interpreted as *in situ* subsoil and contained no bone or artifacts. The unit excavations did not encounter any *in situ* burial features.

2. Removal Of Overburden (Stripping)

Berger's preliminary site investigation included hand-retrieved soil-cores that revealed a layer of fill over much of the project area. In addition, during a prior survey conducted by Greenhouse (1996), imported fill was reported in some areas to depths approximately 1.5 feet (0.46 meters) below the ground surface.



A. Dark brown (10YR 3/3) silty clayey sand, 60% rock (Modern fill)
B. Very dark brown (10YR 2/2) silty clay, 20% rock (Displaced fill)
C. Dark yellowish brown (10YR 3/6) silty sand, 20% rock (Displaced fill)
D. Very dark grayish brown (10YR 3/2) silty sand with clay (Displaced fill)
E. Dark yellowish brown (10YR 3/6) sandy silt, 10% rock (Displaced fill)
F. Dark yellowish brown (10YR 4/4) silty clay, 5% rock (Displaced fill)
G. Dark brown (10YR 3/3) silty sand, 10% rock (Displaced fill)
H. Dark yellowish brown (10YR 3/6) silty sand, 30% rock (Displaced fill)
I. Dark brown (7.5YR 3/2) sandy loam, 60% rock (Displaced fill)
J. Dark brown (7.5YR 3/4) 90% rock (Displaced fill)
K. Dark brown (7.5YR 3/4) 50% rock (Displaced fill)
K1. Dark brown (7.5YR 3/4) 70% rock (Displaced fill)
L. Very dark grayish brown (10YR 3/2) sandy silt, 5% rock (Displaced fill)
M. Dark brown (7.5YR 3/3) sand, 20% rock (Displaced fill)
N. Dark brown (7.5YR 3/4) silty sand, 60% rock (B/C-horizon)
P. Dark brown (7.5YR 3/3) clayey sand, 70% rock (C-horizon)
Q. Strong brown (7.5YR 5/8) 50%; white (N 8) 25%; and very dark grayish green (3/5G) 25% coarse sand (Displaced fill)
R. Strong brown (7.5YR 4/6) silty sand, 75% rock (Displaced fill)
S. Dark yellowish brown (10YR 3/6) silty sand, 10% rock (Displaced fill)

note: O not used as soil designation

Bone
Cloth
Rock
CW Coffin wood

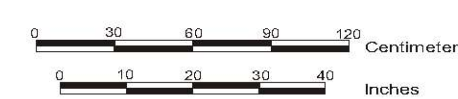


FIGURE 7-9: Soil Profile 4, View to East

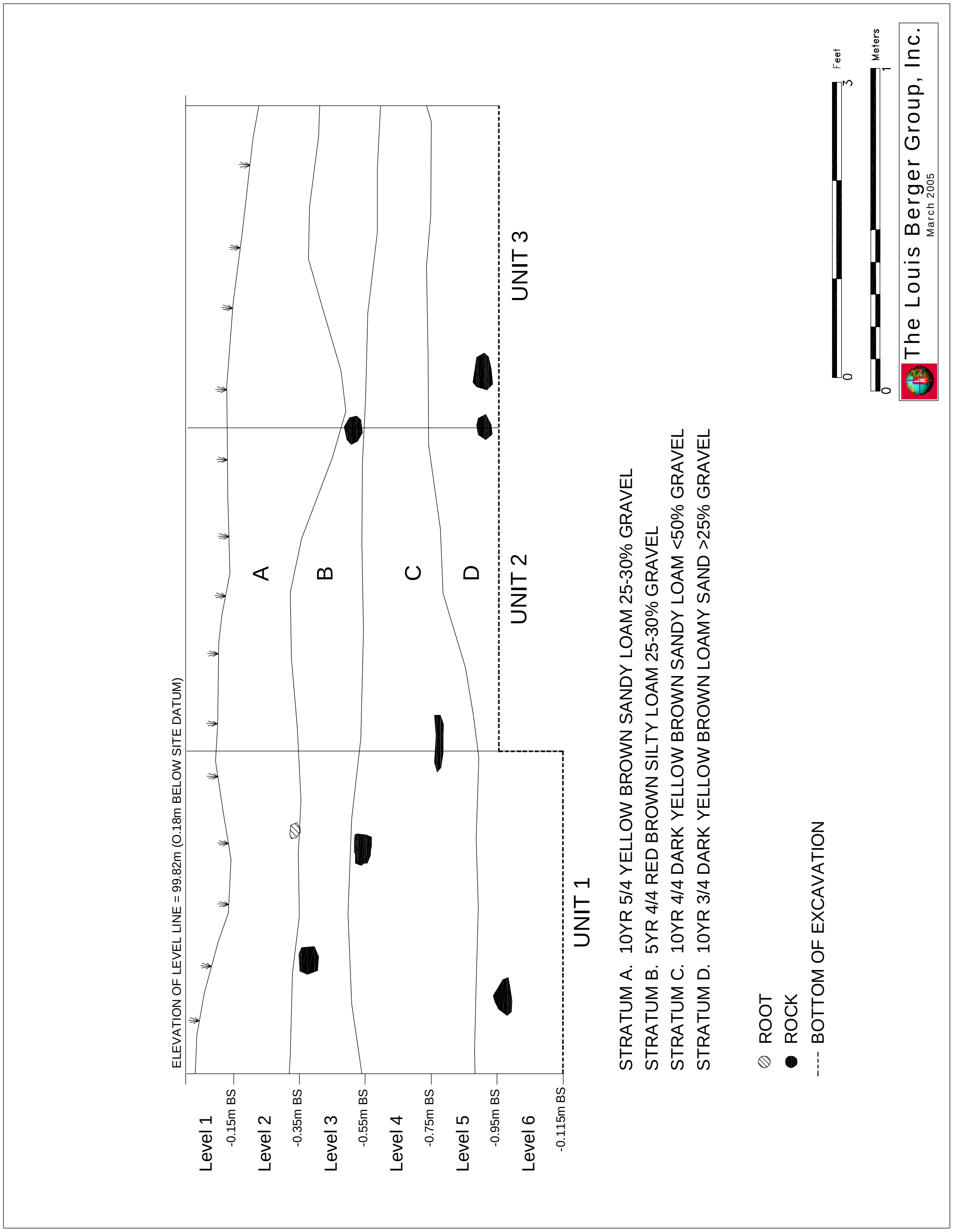


FIGURE 7-10: Soil Profile 5, View to East

Local residents familiar with Potter's Field informed Berger personnel that truckloads of soil had periodically been dumped there in the 40 years since the burial ground had ceased to operate in 1962. Uneven, hummock-like surface conditions immediately north of the Turnpike's bridge also further suggested that fill was overlying the original surface of the burial ground.

Initial excavations within Potter's Field involved careful mechanical removal of overlying sediments (stripping) with both rubber-tired backhoe and tracked excavator. Removal of overburden (stripping) began in February 2003 under the west bay of the Turnpike bridge. Sharpened carbon steel blades were welded over each backhoes' bucket teeth to allow each pass of the blade to expose a smooth and even surface. Each pass with the backhoe bucket removed no more than about 4-inches (0.10 meters) of sediment. As mechanical excavations proceeded it quickly became evident that the initial estimate of 1.5 feet (0.46 meters) of fill was incorrect. In fact, the depth of imported fill removed from many areas within Potter's Field was greater than three feet (one meter).

In general, the mechanical soil removal was undertaken in approximately 0.01-acre (50-square-meter) areas at a time, dictated by the reach of the backhoe's boom from a single location. This procedure limited the area that had to be protected at any one time from weather and disturbances from movement of machines and personnel. In total, approximately 4.1 acres (16,464 square meters) of the project area were stripped during Berger's search for graves. Thus, the area actually stripped by Berger was 3.5 times the estimated 1.16 acres (4,679 square meters) predicted from the boundaries of the burial ground illustrated on Map No. 1679B (see Figure 4-14) in 1950.

Stripping was monitored and the resulting exposed surfaces were carefully examined for evidence of interments by experienced archaeologists. Monitoring teams, consisting of three to four people, supervised the work of the equipment operators and were alert to the subtle differences in soil color and texture that marked the contact zone between imported fill and *in situ* soil and grave outlines.

Monitoring of soil stripping activities focused on identification of grave outlines. When soil characteristics, such as color and texture differences, were exposed that suggested the presence of a grave, monitoring teams stopped the mechanical stripping and carefully removed additional soil by hand to assess whether a grave was present. Grave soil was generally darker than the surrounding matrix of lighter colored subsoil as it is a combination of darker topsoil mixed with lighter subsoil and is further darkened by the organic decay of coffin wood and human tissue. When freshly scraped, the subtle differences between grave fill and surrounding subsoil were usually apparent. When distinguished, the monitors marked apparent grave outlines with nails and string.

Once the graves were located and outlined, the survey/mapping team placed a wooden stake at the head and foot of each grave to facilitate mapping and subsequent exhumation. Each grave was given a unique identification number to facilitate administrative record keeping. Each number was impressed on aluminum tags by the survey crew and then nailed to each wooden stake. Head stakes were additionally labeled with an "H," and foot stakes with an "F," as described above. The survey/mapping crew then recorded the coordinates of both the head and foot stakes of each grave.

The Final Court Order specified that no excavated soils could be carted from Potter's Field to an off-site location. In compliance with this order, the excavated soils were transported by a front-end loader and dump truck to suspected "non-burial" locations within the project area allocated for stockpiling spoils. During the course of the field effort, however, Berger's discovery of burials outside the previously mapped burial ground boundaries guided the excavations into areas used for stockpiling spoils. As such, expansion of the disinterment excavations required frequent and time-consuming relocation of spoils piles (see Figure 7-4).

Stripping involved the removal of imported and native soils from an area measuring approximately 177,223 square feet (16,464 m^2). The average depth of stripped soils was approximately 4.92 feet (1.5 meters). Thus, the amount of soil removed in Berger's search for graves was approximately 32,301 cubic yards (24,696 cubic meters). In addition, approximately two thirds of the soil had to be relocated after stockpiling to accommodate the expansion of the disinterment excavations into areas previously thought not to contain graves. Relocated soils amounted to approximately 21,534 cubic yards (10,976 cubic meters). Finally, at the completion of the disinterment program, all displaced soils had to be replaced and regraded across the project area. The volume of the replaced/regraded soils equaled the volume of the soils originally stripped or 32,301 cubic yards (24,696 cubic meters). All tallied up, from the beginning to the end of the project, Berger moved a total of 78,958 cubic yards (60,368 cubic meters) of soil.

3. Exhumation

a. Excavation Progress – Grave Locations and Burial Ground Boundaries

As discussed above, Berger's excavations at Potter's Field began in the southwestern portion of the burial ground with the systematic stripping of overburden under the west bay of the bridge. To facilitate movement of people and non-mechanized equipment, Berger quickly removed approximately two feet of fill overburden from the area beneath the bridge before proceeding with more carefully controlled stripping to discover graves. This initial removal of overburden was monitored and involved no disturbance to human remains. Once the two feet of overburden were removed and stockpiled, formal and carefully monitored stripping began. The first intact grave was exposed and soon after others were found that evidenced orderly, systematic interments that more or less conformed to the patterning depicted on Map No. 1188. Figure 7-11 illustrates the relationships among the burials discovered in the southwestern portion of the burial ground and those tabulated and plotted on Map No. 1188. Graves were arbitrarily assigned numbers starting with 1, as they were discovered and mapped. Provenienced skeletal elements not found in association with an identifiable grave shaft were collected and assigned sequential numbers beginning with 10,001.

On March 28, 2003, almost one month after the intiation of the field effort, shovel testing through the bottoms of graves from which burials had been removed revealed additional burials below those in the original graves and oriented an average of 20 – 40 degrees counterclockwise from the orientation of the upper graves. These lower burials were not only oriented differently from the overlying burials but the graves that contained them were offset, that is they did not directly underly those above. This discovery of lower burials was initially, and correctly, interpreted as evidence that the southwestern portion of the burial ground had been re-used. That is, that the graves depicted on Map No. 1188 had been interred in imported fill deposited above the earlier burial surface. The lower burials were assigned a new series of consecutive numbers beginning with 11,001.

Figure 7-12 depicts the locations of the lower, earlier, graves in relation to the upper, later interments throughout Potter's Field. As can be seen in this figure, the upper, later graves were only found in the southwestern half of the burial ground. Figure 7-13 shows a denuded area at the approximate location where Berger found the most northeastern later graves. Berger assumes that the denuded area depicted on the aerial is an area of active grave digging in 1950 after which year only 95 graves were dug in the burial ground. From field evidence and the evidence derived from the maps and the Burial Register, it appears that interments at Potter's Field were begun at a time much earlier than the earliest burials depicted on Map No. 769 in 1916; that the earliest graves were dug in the southwestern portion of the burial ground and that interments continued across the elevated ground to the northeast until 1923; After 1923, interments were continued in the southwestern portion of the project area in imported fill deposited over the layer of earlier burials.

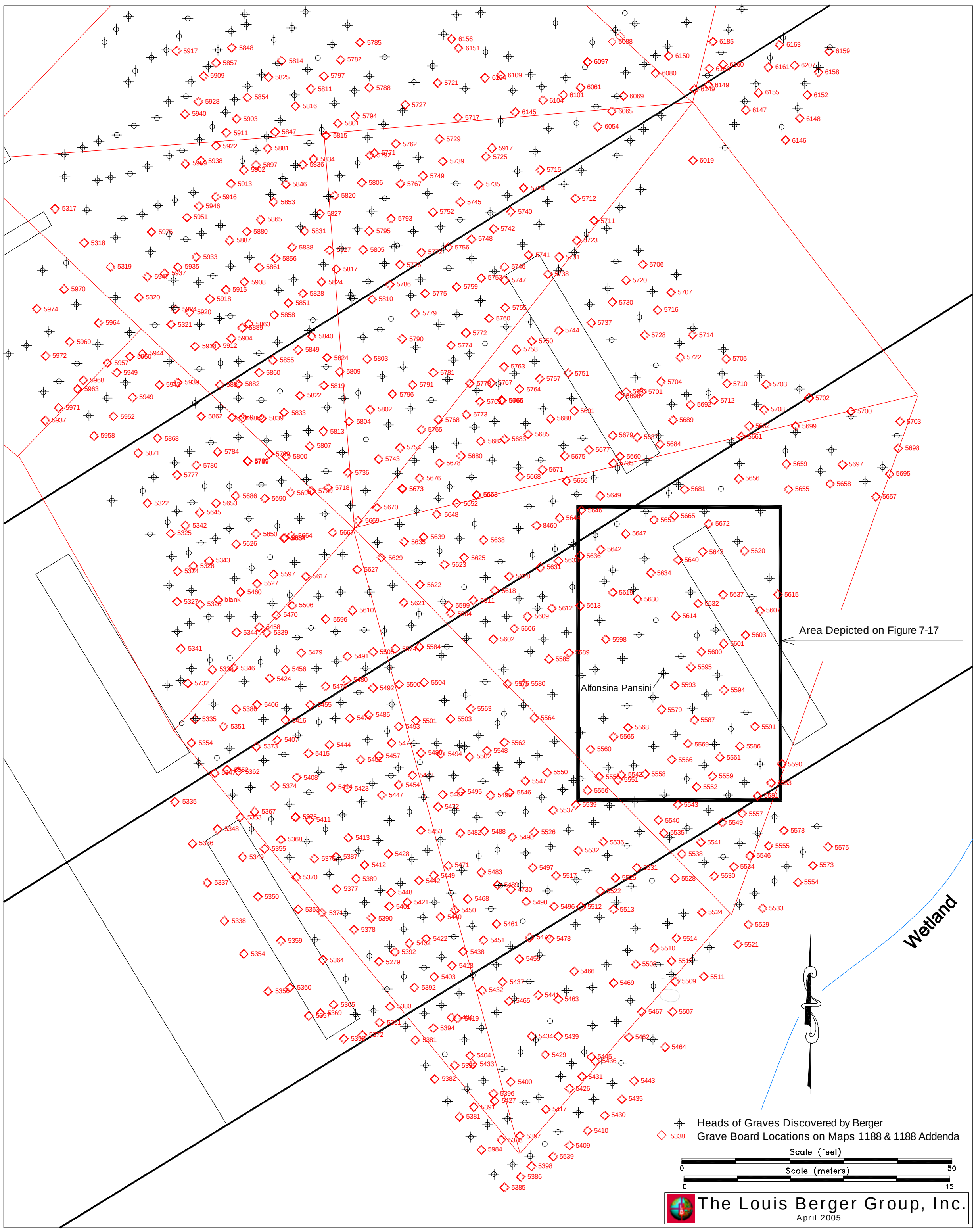


FIGURE 7-11: Spatial Relations Among Grave Boards on Maps 1188 & 1188A and Graves Discovered by Berger in the Southwestern Portion of Potter's Field

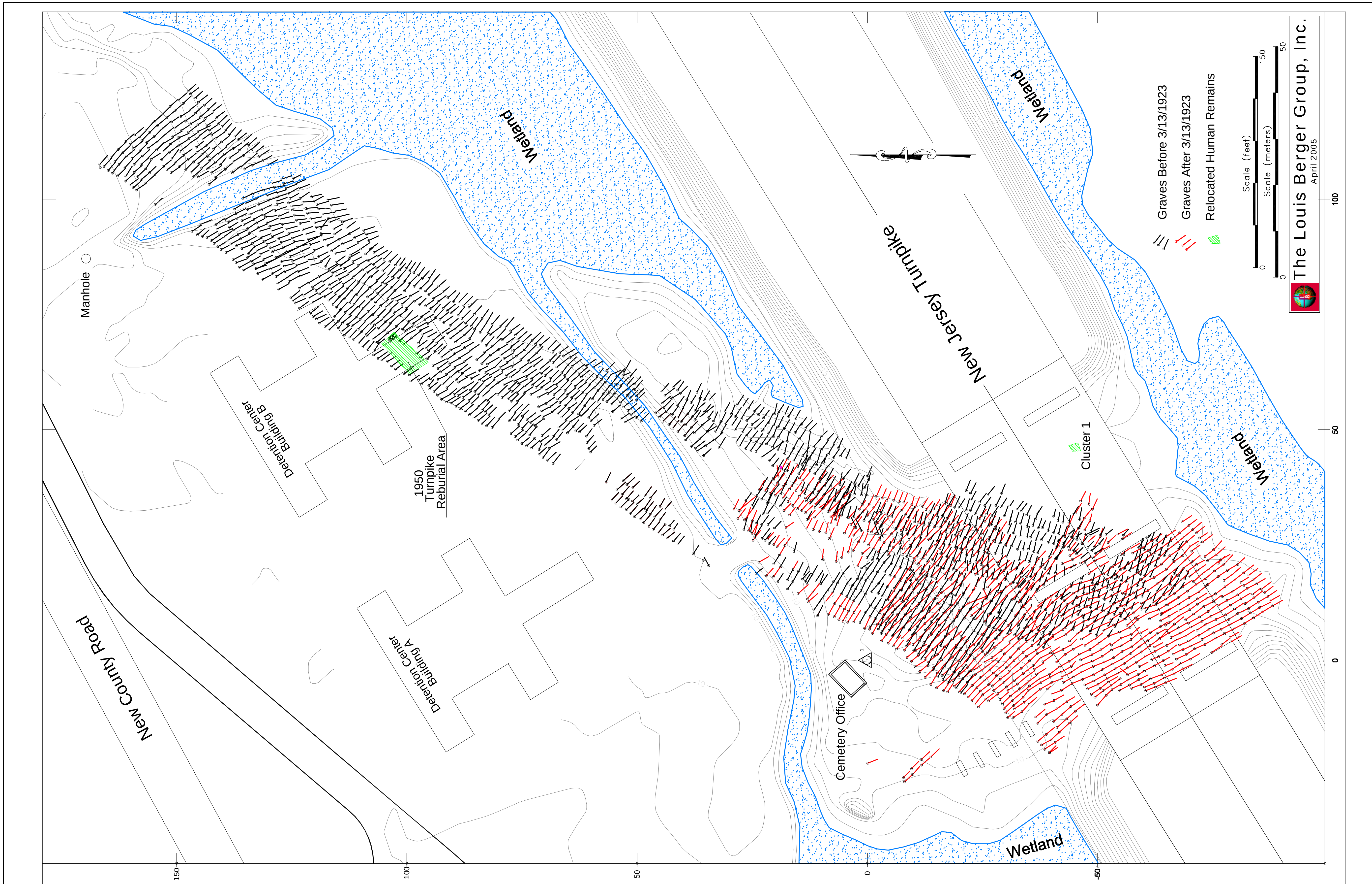


FIGURE 7-12: Locations and Orientations of all Graves Located and Disinterred by Berger

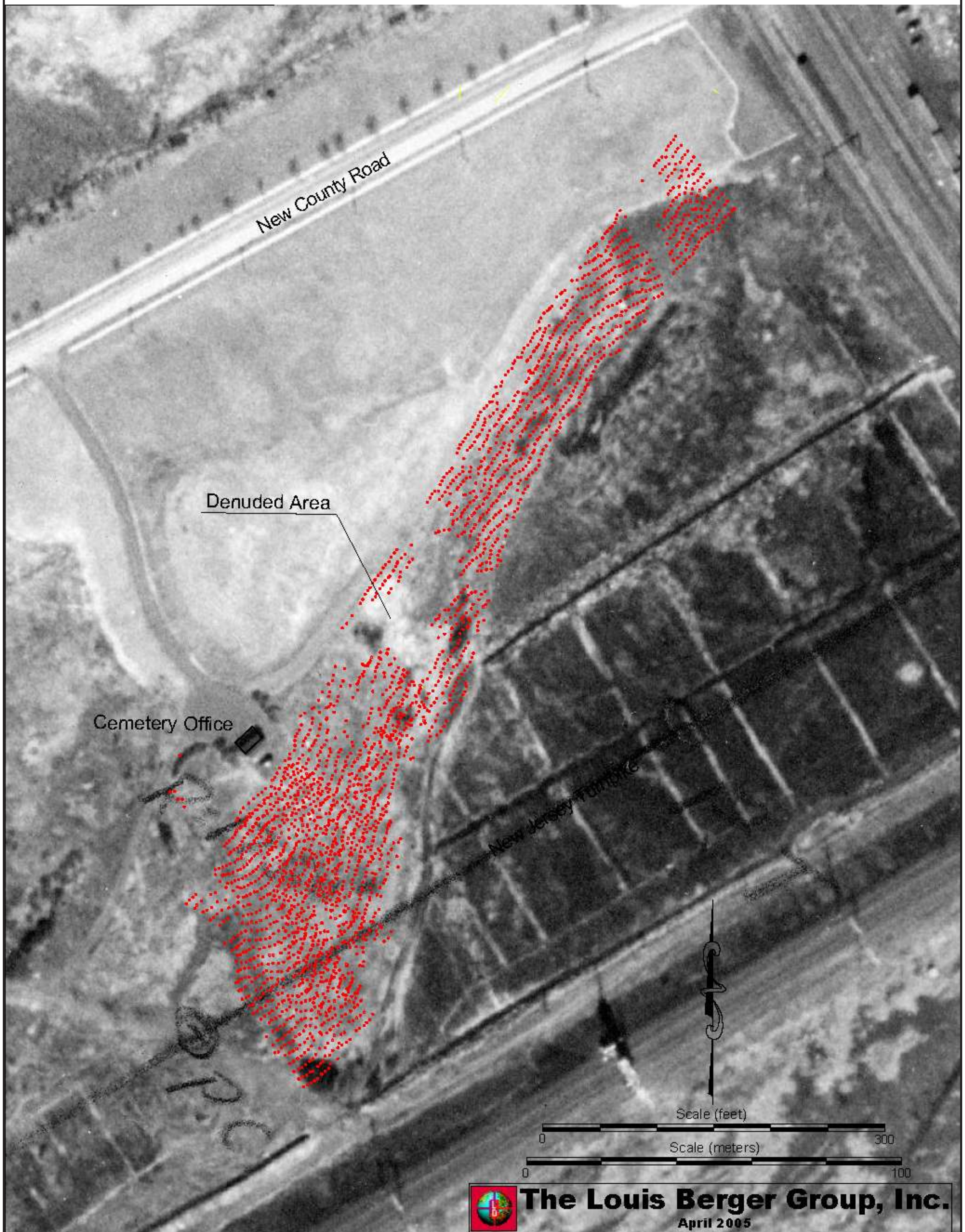


FIGURE 7-13: 1950 Aerial Photograph Showing Denuded Area of Grave Digging

By early June 2003, Berger's excavations had revealed graves well beyond the anticipated limit described on the 1935 burial ground map (Map No. 1188). Stripping soon exposed graves far to the northeast of the eastern security fence surrounding the detention center and into the area depicted on Map No. 769. It appeared highly likely that graves might continue past the fence into a wooded tract occupying the northeastern section of the project area. Exploratory Trench 10 was dug immediately east of the detention center and exposed a line of graves extending 91.86 feet (28 meters) north to south, confirming the presence of graves east of the detention center. Grave outlines also were observed in Exploratory Trench 12 positioned in order to explore the far eastern edge of the burial ground, establishing that Berger's placement, on the ground of Map No. 769 was accurate with respect to distance and orientation. After removal of the fill overburden, Berger identified 323 graves containing 630 burials in the area depicted on Map No. 769 (Figure 7-14).

The patterning of graves found by Berger was remarkably similar to the details of Map No. 769, allowing immediate identification of many burials by name, and eventually of 441 burials in this section of Potters Field — more than half the number of all identity matches made during the project. The verification of the location of this portion of Potter's Field also verified the beginning date for the re-use of the southwestern end of the burial ground.

b. Grave and Burial Characteristics

The Burial Register lists 5,635 graves (Lots) containing 9,781 interments for an overall average of 1.736 interments per grave. Table 7-1 summarized the numbers of interments and graves and the average number of interments per grave by year. Archaeological fieldwork at Potter's Field resulted in the discovery of 2,693 graves, containing 4,571 individual remains for an average of 1.7 interments per grave. Berger recovered 47.8 percent of the graves and 46.7 percent of the interments listed in the Burial Register for the Hudson County Burial Grounds. The reasons for the difference between the numbers listed and those found by Berger is not clear but certainly include interments located in the two other former burial grounds outside the limits of Potter's Field, construction disturbance, and total decomposition of some burials.

Berger is confident that it located and recovered the human remains from all identifiable graves within the project area. It is also certain that 2,942 graves listed in the Burial Register were not located nor exhumed by Berger. It is likely that many of graves not found by Berger are located in the other two "burial grounds" depicted as being further west on the 1907 map. If so, then it is likely that the three burial grounds were being used for interments concurrently prior to March 13, 1916. The three maps (769, 1188, and 118 Addenda) depict and/or tabulate a total of 1,377 graves that were mapped in Potter's Field between May 13, 1916 and December 20, 1941 and these represent all of the graves listed in the Burial Register between these dates. This data demonstrates that Potter's Field was being exclusively used for burials between May 13, 1916 and December 20, 1941.

Whether the 1,316 graves found by Berger but not shown and/or tabulated on the three historic maps are later or earlier than the mapped graves cannot be known with certainty. However, the 1950 aerial photograph evidences use of Potter's Field later than 1941 and there is no evidence on the photograph that the western burial grounds are in use in 1950 (see Figure 7-13). Evidence for disturbance and gaps in the burial patterns strongly suggest that many more graves were dug in Potter's Field than Berger found but these were subsequently obliterated by construction activities. The clearest evidence for disturbance are the graves missing from the pattern in the area of the east-west ditch draining the western wetlands and the north-south ditch crossing the eastern end of the burial ground. From this evidence, it is likely that many of the early graves not located by Berger are in the western burial grounds and that later graves were obliterated by construction.

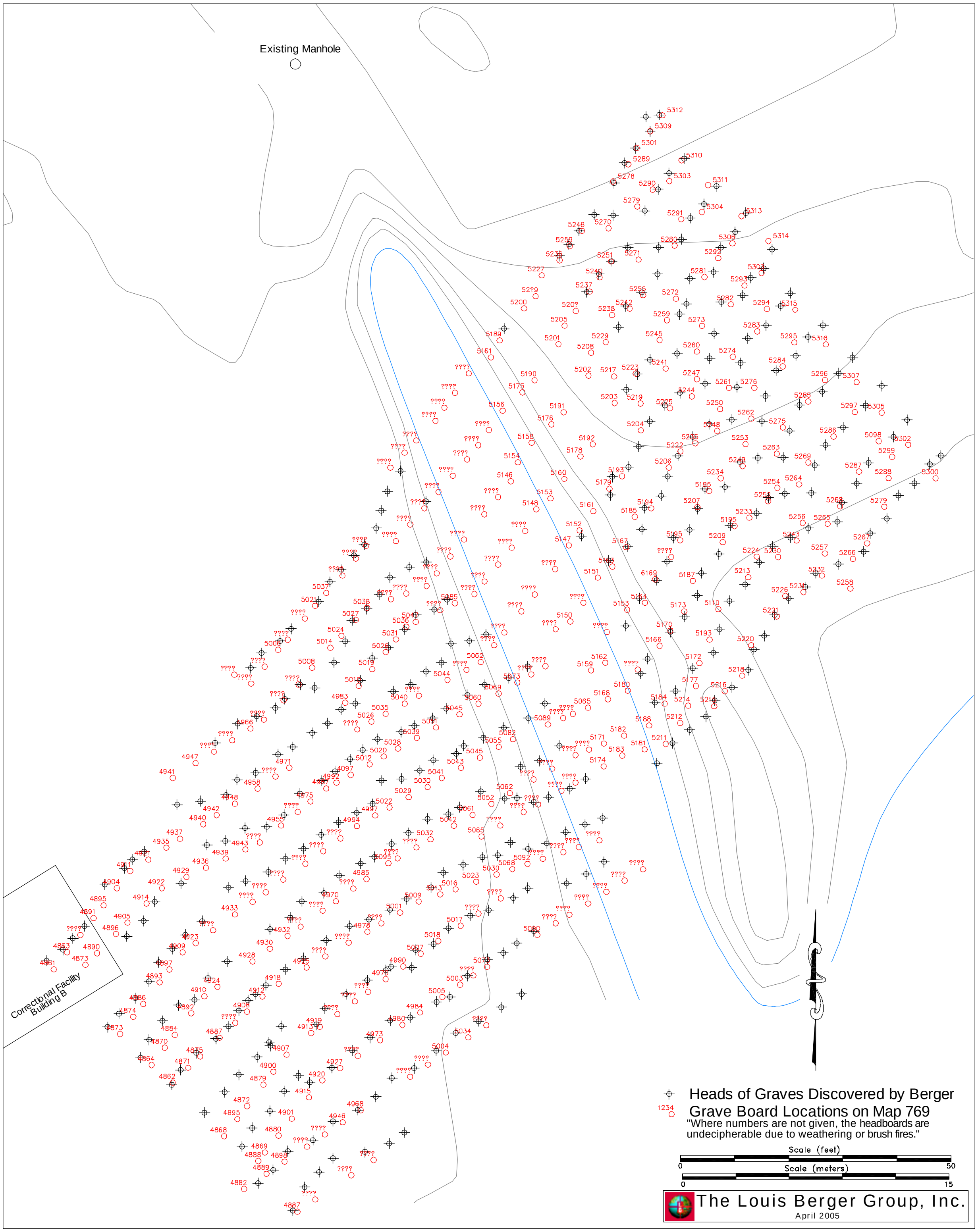


FIGURE 7-14: Spatial Relations Among Grave Boards on Map 769 and Graves Discovered by Berger in the Northeastern Portion of Potter's Field

Further evidence of disturbance was the discovery of the partial remains of a minimum of 65 individuals by reference to the number of left femurs, in a common pit labeled "Cluster No. 1" under the Turnpike bridge (see Figure 7-12 and detailed discussion below). This discovery evidences that at least 65 individuals were disturbed prior to Berger's field effort and may represent the remains from some of the many disturbed graves discovered by Berger (graves containing only partial remains).

c. Condition and Preservation of Burials

The condition of burials discovered at Potter's Field varied primarily as a result of taphonomic factors. Taphonomy is the study of what happens to organism between the time of burial and its discovery. This includes post-mortem biological, chemical, and physical decomposition, displacement, compaction, and other factors that affect the remains.

Decomposition begins at death and, though relentless, the rate of decomposition is influenced by environmental factors such as humidity, temperature, and surrounding soil characteristics and by the characteristics of burial containers (coffins, caskets, shrouds) since they provide protection of varying degree and duration from the effects of soil contact. Depth of burial also affects decomposition rates because deeper soils are different chemically and biologically from shallower soils. Burials in deeper soils are less likely to be affected by meteorological variations such as temperature (freeze-thaw conditions) and rainfall, intrusion by burrowing animals and roots, and disturbance by mechanized earth-moving activities. Deeper burials are, however, more likely to be affected by ground water which can either retard or accelerate the process of decomposition.

Most, if not all, of the graves in Potter's Field were dug into similar soils with chemically and biologically active upper soil horizons and lower sediments that were much less active chemically and biologically. These vertical soil differences affected decomposition rates, and thus the condition, of burials placed at different positions (upper, middle, lower) in a grave. In a level burial ground with similar soils throughout, differences in the condition of burials will be directly related to date of burial and container type.

The graves in Potter's Field were dug into a landform that was not level. The primary differences in condition seen among burials at Potter's Field are the result of differences in elevation of the original surface and its relation to the water table and to surfaces created by construction after the abandonment of the burial ground. Graves in the higher, northern sections of the burial ground were dug into relatively dry ground. The bottoms of the highest of these northern graves did not intercept the water table but they were more likely to have been affected by construction. Graves dug in the southern elevationally lower portions of the burial ground often penetrated the water table. The lowest burials in some of these graves were perpetually submerged while the upper burials in the lowest graves were periodically submerged. These differences in burials' relation to the water table differentially affected the condition of remains.

Potter's Field, located in a vast wetland, was strongly influenced by the effects of a tidal water table. Burials that were found in the lowest, perpetually saturated, anaerobic soils tended to be well-preserved. In the middle hydrologic zone the surface of the water table oscillated vertically in response to tidal and meteorological factors. Soils in this zone were episodically wet-dry, which accelerated biologic and chemical decay. The majority of poorly preserved and completely decomposed remains were recovered from this middle hydrologic zone. An upper normally dry zone yielded many well-preserved burials in areas not disturbed by construction (Plates 7-21 thru 7-25).

PLATE 7-21: Burial No. 438 B

PLATE 7-22: Burial No. 882 B

PLATE 7-23: Burial No. 376

PLATE 7-24: Burial No. 656 B

PLATE 7-25: Burial No. 745

d. Typical Grave

Though disturbance to the burial ground had effectively obliterated any definitive evidence of the elevation of the ground surface at the time of burial, comparisons of 1930 contour mapping by Hudson County and recent contour mapping by the Turnpike Authority evidence that the depth of graves in Potter's Field averaged approximately 5.5 feet (1.67 meters) below the surface(s) through which they were interred (Figure 7-15). Field measurements documented the average grave was 6.8 feet (2.1 meters) long and 3.9 feet (1.2 meters) wide.

The Burial Register indicates that during the first twenty years of the Hudson County Burial Grounds operation most of the interred were buried in individual grave shafts. The first recorded grave with multiple burials was Lot (grave) 323 on May 6, 1883 but the average burials per grave was less than 1.5 until 1901. The trend toward multiple use of a single grave increased from an average of 1.05 interments per grave in the 1880s and 1.22 interments per grave in the 1890s to 2.07 interments per grave in the 1900s. It was not until 1903 that the average number of interments per grave exceeded two (2.53). Single burials, however, did occur sporadically throughout the 82 year period of use of the burial ground. Table 7-3 summarizes by year and decade the numbers of graves and interments, and provides the average interments per grave for the first three decades of the use of Potter's Field.

TABLE 7-3

LOTS AND INTERMENTS BY DECADE
BETWEEN 12/31/1880 AND12/30/1910

YEAR	INTERMENTS	LOTS	INTERMENTS/LOT
1880	1	1	1.00
1881	126	126	1.00
1882	170	168	1.01
1883	119	118	1.01
1884	118	116	1.02
1885	153	144	1.06
1886	141	130	1.08
1887	165	145	1.14
1888	139	122	1.14
1889	168	157	1.07
Total 1880s	1300	1227	1.05
YEAR	INTERMENTS	LOTS	INTERMENTS/LOT
1890	177	161	1.10
1891	202	202	1.00
1892	211	193	1.09
1893	171	146	1.17
1894	166	126	1.32
1895	155	113	1.37
1896	177	128	1.38
1897	179	126	1.42
1898	157	138	1.14
1899	131	106	1.24
Total 1890s	1726	1439	1.22
YEAR	INTERMENTS	LOTS	INTERMENTS/LOT
1900	162	130	1.25
1901	191	99	1.93
1902	228	132	1.73

TABLE 7-3 (continued)

1903	147	58	2.53
1904	202	90	2.24
1905	171	80	2.14
1906	136	61	2.23
1907	115	52	2.21
1908	136	60	2.27
1909	128	60	2.13
Total 1900s	1616	822	2.07
30 Year Total	4642	3488	1.33

Based on a sample of 382 "lower" or earlier graves that Berger located and exhumed in the southwestern portion of the burial ground, 304 contained a single burial, 60 contained two burials, and 18 contained artifact evidence for at least one burial but no human remains were present. Thus, these lower, earlier graves discovered by Berger contained at least 304 + 120 +18 or 442 interments in 382 graves yielding an average of 1.16 interments per grave. The average interments per grave listed in the Burial Register during the first 30 years of operation for the burial ground is 1.33. The data derived from the Burial Register concerning the numbers of burials per grave for its earliest burials correlate well with Berger's findings from the lower graves in the southwestern portion of Potter's Field.

The date ranges of coins recovered from the lower burials also support the assumption that lower, southwestern burials represent the oldest interments in Potter's Field and probably some of the earliest notations in the Burial Register. Of the 46 coins recovered by Berger from lower, earlier graves, 37 with legible dates ranged from 1872 to1901 with a mean date of 1890. Nine coins from the lower burials with obscured dates all were of types that predated 1901.

The Burial Register indicated that graves with more than one interment typically contained an upper and lower burial, labeled "top" and "bottom" in the Burial Register. A very small number of burials were labeled "side," and these were almost always stillbirths or "foundling" infants. On occasion, the Burial Register recorded four, five, and even six stillbirths in a single grave. In general, Berger's findings corroborated these general trends.

e. Cluster No. 1

Although the limits of where grave shafts occurred in the east bay of the Turnpike's bridge corresponded well with details derived from the historic maps of the burial ground, the discovery of the lower, earlier, burial surface forced the Berger team to recognize that these historic maps, while accurate with regard to the elements displayed therein, could not be held accountable for what was not displayed. Investigations continued, therefore, to sufficient depth to guarantee that all grave shafts, isolated bones, or non-shaft features had been located and investigated before Berger could hand-off the project area to the Turnpike Authority as being clear of all human remains. To this end, after Berger's crew had exhumed all burials from portions of the burial ground a backhoe was employed to mechanically strip the area beneath the final burial surface under the watchful eyes of the monitoring teams.

In late June 2003, monitors noticed bone from an area near the southeast corner of the east bay. Using hand-tools to expose the finds, the team defined a dense, elliptical concentration of bone measuring approximately 6.5x10 feet (2x3-meters) laterally with a maximum height at its center of 27.5 inches (70 centimeters). Designated Cluster No. 1, this feature consisted of hundreds of disarticulated but generally well-preserved bones, representing mostly long bones, skulls, and pelvises (Plates 7-26 thru 7-29). The exhumation of remains within the cluster was organized by calculating the minimum number of individuals (MNI) of the entire sample. This measurement arrives at the smallest number of individuals

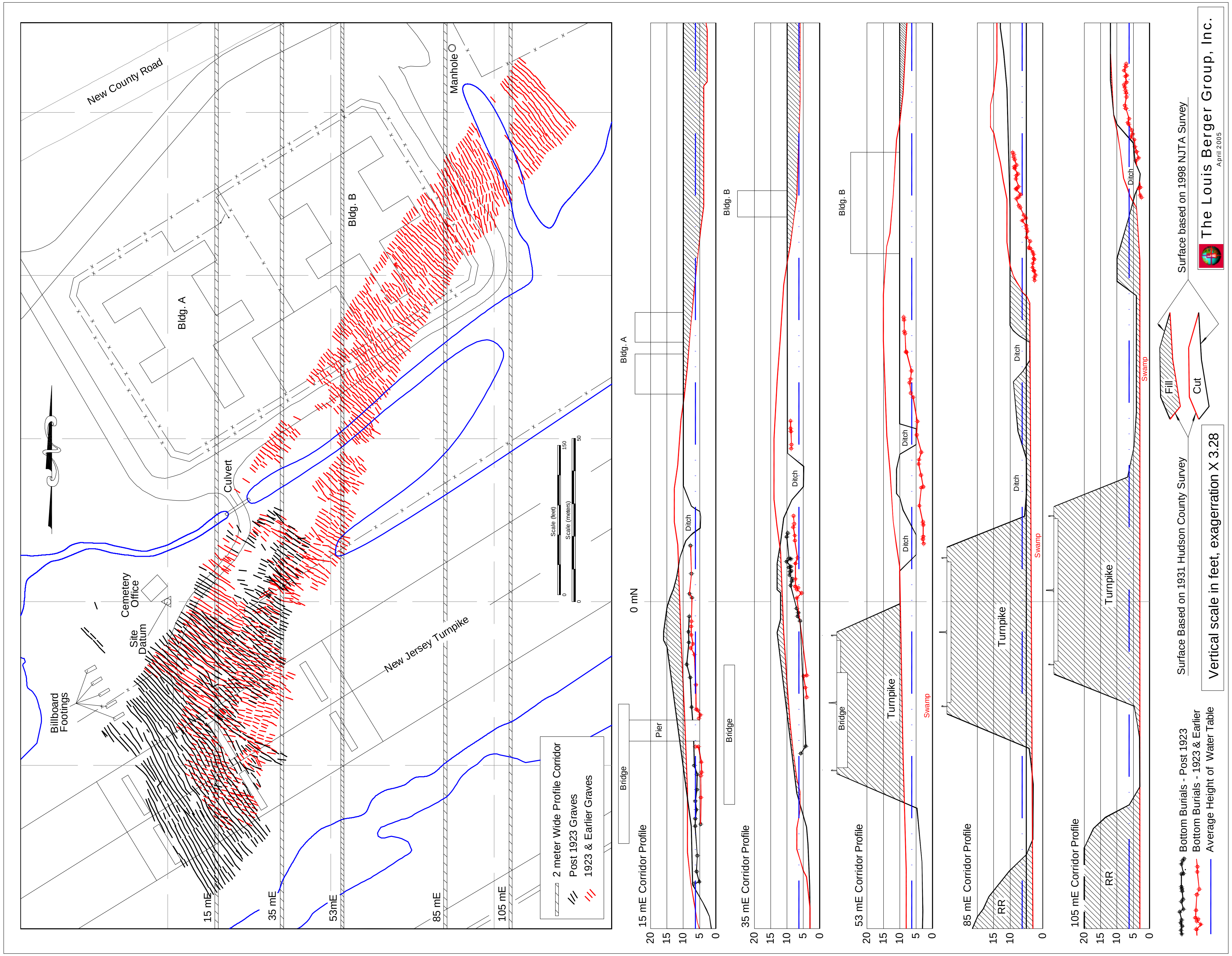


FIGURE 7-15: Profiles of Potter's Field Depicting the 1931 and 1988 Ground Surfaces and Their Relation to Burials, Structures, and Cut and Fill Disturbance

PLATE 7-26: Discovery of Cluster No. 1

PLATE 7-27: Detailed View of Cluster No. 1


PLATE 7-28: Investigation of Cluster No. 1


PLATE 7-29: Exhumation of Cluster No. 1

possible from the most common skeletal element in the sample (Lyman 1993:38). Using the left femur as the referent element, a minimum of 63 individuals was enumerated from the cluster assemblage. Each left femur was assigned a unique identification number and alpha beginning with No. 20,001, to distinguish these remains from the grave shaft burials. Due to the absence of any articulation between skeletal elements, the remainder of the cluster sample was boxed by bone type and assigned an overall 20,000-series identifier.

The contents of Cluster No. 1 were recovered from two soil strata characterized as construction fill. The upper bone-bearing stratum was a brown very fine sand with small quantities of rounded pebbles and gravels; the lower stratum was brown medium sand with large angular rock inclusions. The base of the bone cluster rested on clean gley coarse sand, also characterized as construction fill because of its stratigraphic relationship with the eastern bridge pier to which it extended. The coarse sand displayed a variable thickness of between 11.5 inches (30 centimeters) and 39 inches (100 centimeters) and yielded no cultural material. Roughly elliptical in planview, Cluster No. 1 exhibited an inverted parabolic shape in profile, with flat base and decreased thickness toward the perimeters. In form and location, the cluster appeared to have been dumped on the surface of the coarse sand and covered with the overlying sand layers.

Seventy-three artifacts were recovered from Cluster No. 1 and few appear to have even remote associations with the Potter's Field burial population. The most common item was plastic debris, with such improbable grave goods as an automobile taillight, ceramic tile, a refrigerator part, and a cigar mouthpiece. These artifacts are interpreted as modern trash incorporated into the soil layers, which tends to confirm the notion that the sand represents construction fill.

The questions "who," "what," and "when" persist with regard to Cluster No. 1 and cannot at this time be adequately answered. It is clear however, that a minimum of 65 individuals were disturbed from their respective grave shafts, their contents collected, and then dumped and covered over under the Turnpike's bridge, with no reference to their location or identity noted in the Burial Register or on any engineering map. It is the absence of all information about this reburial cluster that suggests the action was taken without the knowledge of the cemetery administration or Turnpike Authority.

f. Turnpike Reburials

Planners for the New Jersey Turnpike in 1949 and 1950 exploited the Meadowlands as a major corridor for the highway because it was largely an undeveloped tract that could be appropriated at low cost and with a minimum of property condemnations. The right-of-way that was selected crossed the southern portion of the Hudson County Burial Ground, then still in use, and original design plans for the highway show an earthen berm situated on top of the burial ground. Just prior to construction in 1950, however, the Turnpike Authority recognized the complexity and expense of undertaking large-scale disinterment of burials located in the path of the highway. The Turnpike Authority elected instead to span the burial ground with an elevated section of highway, preserving in place hundreds of interred remains. Still, the installation of the bridge piers required the disinterment of 84 individuals and their re-interment elsewhere in the burial ground, which occurred between November 21-29, 1950. Notations were made in the Burial Register referring to "remains of unclaimed bodies disinterred and reburied by C.J. Reiman for N.J. Turnpike." C.J. Reiman was a local funeral director active at Potter's Field from 1939 to 1961. A "reburial plot" was sketched on county engineering Map No. 1679B as a 20x50-foot rectangle outside, and 140 feet north, of the main burial ground (see Figure 7-12).

The discovery of graves up to the edges of detention center Building B made it necessary to demolish the southern and eastern wings of Building B in order to examine the ground beneath the building for graves (Plates 7-30 and 7-31). Upon removal of the building wings, soil stripping revealed a surprising number of intact graves beneath the structure, preserved largely by the construction technique of elevating the floors on concrete pilings. Distinct among the rows of grave shafts exposed under the southern wing was a rectangular area devoid of any shafts, yet which contained discrete groups of human skeletal remains. Sets of remains took the form of bone bundles rather than the standard arrangement of extended or flexed positions that were typically found across Potter's Field. Exposed skeletal elements tended to be large, dense bone, particularly skulls and long bones (Plates 7-32 thru 7-35). Coffin wood was not in evidence, and in contrast to single shaft-burials, these bundles often contained elements of multiple individuals. After exposing all the bundles it was clear that they were located within a trench, the excavation of which had cut through about a dozen graves along its northern and southern edges.

Analysis of the minimum number of individuals (MNI) represented within the trench, using the number of crania as a reference, determined that the area contained 43 individuals. Each of these was assigned a unique identification number starting with No. 25,001. Utilizing a discrete series to identify the bundle burials enabled later analyses to more easily differentiate these individuals from *in situ* graves. Few artifacts were recovered from the exhumation of the 25,000-series burials, yet the assemblage was significant for the information it did yield. Aside from a few leather and metal fragments, the sample contained 29 thin lead strips stamped with the names of individuals disinterred from the vicinity of the proposed Turnpike bridge piers in November 1950. In a few examples, the name was simply a description as in "Unknown Man" or "Unknown Colored Man," copying the entry as it was written in the Burial Register. Each intact name tag had small holes on either end and a few tags retained nails and the wood fragments to which they had been tacked. It is possible that the wood fragments represented fragments of small wooden boxes into which the collected remains had been placed and reburied.

Clearly, the trench containing human remains corresponded to the "reburial plot" illustrated on Map 1679B — sketch map showing reburial plot in connection with NJ Turnpike construction. The character of the bundle burials is precisely what one would anticipate from the retrieval of highly decomposed

PLATE 7-30: Stripping Adjacent to Building B

PLATE 7-31: Discovery of Burials Adjacent to Building

PLATE 7-32: Area of Bundle Burials

PLATE 7-33: Excavation of Bundle Burial

PLATE 7-34: Thin Lead Strip Stamped with Name

PLATE 7-35: Overview of a Portion of the Turnpike's Reburial Plot from 1950

corpses more than 25 years after their initial interment. Small and fragile bones are missing from the bone bundles because they would have decayed first, or because they were easily missed at the time of disinterment. The sophisticated techniques of archaeological exhumations with particular attention to the stratigraphic relationship of burials was certainly beyond the mandate of C.J. Reiman, resulting in co-mingling of remains, as was observed in the re-interment trench. In addition, effective recovery of artifacts requires time-consuming screening of all shaft fill, without which, few artifacts would have been found. The lack of artifacts in the reburial plot suggests that this was not a concern of the exhumers, and it is unlikely that the identification and recovery of poorly preserved artifacts and bone was within their capabilities or interest.

4. Grave Numbering

As has been indicated elsewhere in this chapter, graves were assigned numbers as they were discovered and mapped by Berger's team members. Initially Berger intended to assign the number 1 to the first grave identified and sequentially number all graves, as they were discovered. Unforseen factors influenced a change in the numbering sequence to accommodate variables Berger considered important in tracking the archaeological and contractual contexts of the discovered graves. Table 7-4 summarizes the numerical coding system employed by Berger throughout the disinterment program at Potter's Field.

TABLE 7-4

GRAVE NUMBERING SEQUENCES

SERIES START	CONTEXT
1	Original Series
999	Unprovenienced Skeletal Elements From Surface and/or Backdirt
10,001	Remains Not Associated With Identified Grave
11,001	Lower Graves in Southwest Below Those on Maps 1188 & 1188 Addenda
15,001	Graves Found Outside Turnpike Estimated Burial Ground Boundaries
20,001	Individuals Exhumed From Cluster No. 1
25,001	Individuals Exhumed From Turnpike's Reburial Plot

5. *Identification by Name of Human Remains*

The identification (naming or matching to an entry in the Burial Register) the sets of human remains exhumed from Potter's Field was an important objective of Berger's analysis. Out of the 4,571 sets of human remains disinterred from Potter's Field, Berger identified, by name 825 individuals. Of these, 470 were identified in the area of Potter's Field shown on the remarkably accurate Map No. 769 by reference to the mapped grave locations. Contributing to the identification of these 470 individuals was the recovery of 36 coffin number plates bearing numbers assigned by various undertakers and listed in the Burial Register. Coffin number plates assisted in the identification of 214 burials from Potter's Field and coffin plates bearing the actual names of the deceased identified 15 additional individuals. The identification of one individual was verified by virtue of initials on a ring found with his remains. Once a single individual in a grave was positively identified, then others in that grave were identified, as well.

The most important sources of information that contributed to the identification of additional individuals were maps 1188 and 1188 Addenda, and the Burial Register. The maps contributed measured locations for individual graves in the areas of the burial ground they depicted. The Burial Register contributed information concerning the characteristics and locations of individuals buried in the depicted graves.

An essential first task in the identification process was to establish the spatial relationships between the mapped and triangulated grave board locations from maps 1188 and 769 and the graves identified by Berger in the field. As such, Berger prepared AutoCAD maps depicting grave board locations from the 1188 and 769 maps on a separate layer from the mapped locations of graves discovered in the field. Figure 7-11 depicts the relationships among the grave boards plotted and/or triangulated on Map No. 1188 and graves discovered by Berger in the southwestern portion of the burial ground; see Figure 7-14 for the relationships among the grave boards plotted on Map No. 769 and graves discovered by Berger in the northeastern end of the burial ground.

Direct and precise spatial correlations between the locations plotted on the maps and Berger's mapped locations are rare. The differences are probably the result of the lack of consistent relationship between the location of grave boards and the actual location of the graves when the maps were prepared. In addition, the locations of Berger's head stakes certainly varied in relation to the actual location of the head of the graves because the precise edges of graves could only be approximated in the field by Berger's monitoring crews.

Striking similarities are, however, apparent in the alignment and curvature of rows of graves and in the spacing of graves in the rows. Matching the patterns of mapped graves with the patterns of graves located by Berger was the initial step in the identification process. The patterned similarities were clarified by cartographically displacing one layer to register as closely as possible with the other layer. Figure 7-16 illustrates how the process of moving the layer depicting grave locations from the historic burial ground maps less than 0.7 meters clarified the patterned spatial relationships among the graves. This was a localized process as the magnitude and direction of layer displacement necessary to align mapped and located burials varied from place to place in the burial ground.

Once the spatial relationships between graves were cartographically registered, then the contents of the graves exhumed by Berger could be compared with the contents of the corresponding mapped grave as described in the Burial Register. The characteristics listed in the Burial Register that are likely to be perceptible in the field are burial position, age, and gender. Burial position was, with a very few exceptions, listed for all burials. Age was listed for most burials until October 1932 at which time the handwriting in the Burial Register changed suggesting that recording the ages of the interred was a job requirement not passed on to a new recorder. Gender was only rarely listed but was inferred from first names in most cases. Variables that contributed to the identification of graves were number of burials in particular graves and the inclusion of amputated limbs, stillborns, fetuses, and "foundlings" (Figure 7-17).

The preservation and completeness of recovered remains substantially influenced whether identification was possible. Remains for which measurements and observations could not always reliably be made were often not positively identifiable as to gender and/or age. These included 3,871 (84.6 percent) remains in poor and fair condition with 3,447 less than 50 percent complete. Only 2,515 (55 percent) burials were identifiable as to sex and age at death was determined for only 2205 (48 percent) burials. It was often not possible to determine burial position for remains, even those that were relatively well-preserved, if they were commingled in collapsed graves. A total of 1,997 (43 percent) Potter's Field burials were commingled to the extent that the skeletal elements could not be segregated.

6. Features Other Than Graves

At the onset of Berger's disinterment program at Potter's Field in 2003, the lone surface remnant of the abandoned burial ground was a dilapidated one-story 23x14-foot brick structure that had functioned as the cemetery office (Plate 7-36 thru 7-38). Lacking a cellar, the brick foundation sat on a concrete sill with the wood floor supported mid-structure by a single concrete pier. The doorway was located on the north side, a chimney on the west end. Windows, flanking the entryway and chimney, exhibited protruding brick sills. The south side of the office was largely demolished and any evidence of entryway or windows was not present. The east end of the building was featureless. The side-gabled roof was supported by a wood-truss rafter and was covered with common wood shingles. Despite the small size of the office and its apparent utilitarian purpose, design elements in the structure indicate an attention to detail that suffuses the building with an architectural elegance which belies the present state of the site. Exposed rafter tails and ornamentation consisting of rough-cut stone inclusions in the brick walls suggests the Craftsman style, popular from about 1905 to the early 1920s (McAlester and McAlester1984:453-463). The choice of this style is an interesting one as it seems a deliberate attempt to create a wholly American cast to the surroundings, rather than the Victorian or ancient Egyptian influences which were popular styles for cemeteries in the decades of the late-nineteenth century and early twentieth century. As such, the cemetery office was probably more than just a workplace for cemetery administration, it was the gateway to the burial ground itself, and as such it aspired to a solemnity and importance beyond its small size. The architectural details with which the building was endowed are symbolic of this inferred prominence.

To the west of the cemetery office and extending to the fringes of the wetlands and pond, three brick footers and three postmolds which together form a straight line extending for a distance of about 28 feet (8.6 meters) were discovered. Intervals between these features were approximately 6.5 feet (2.0 meters),

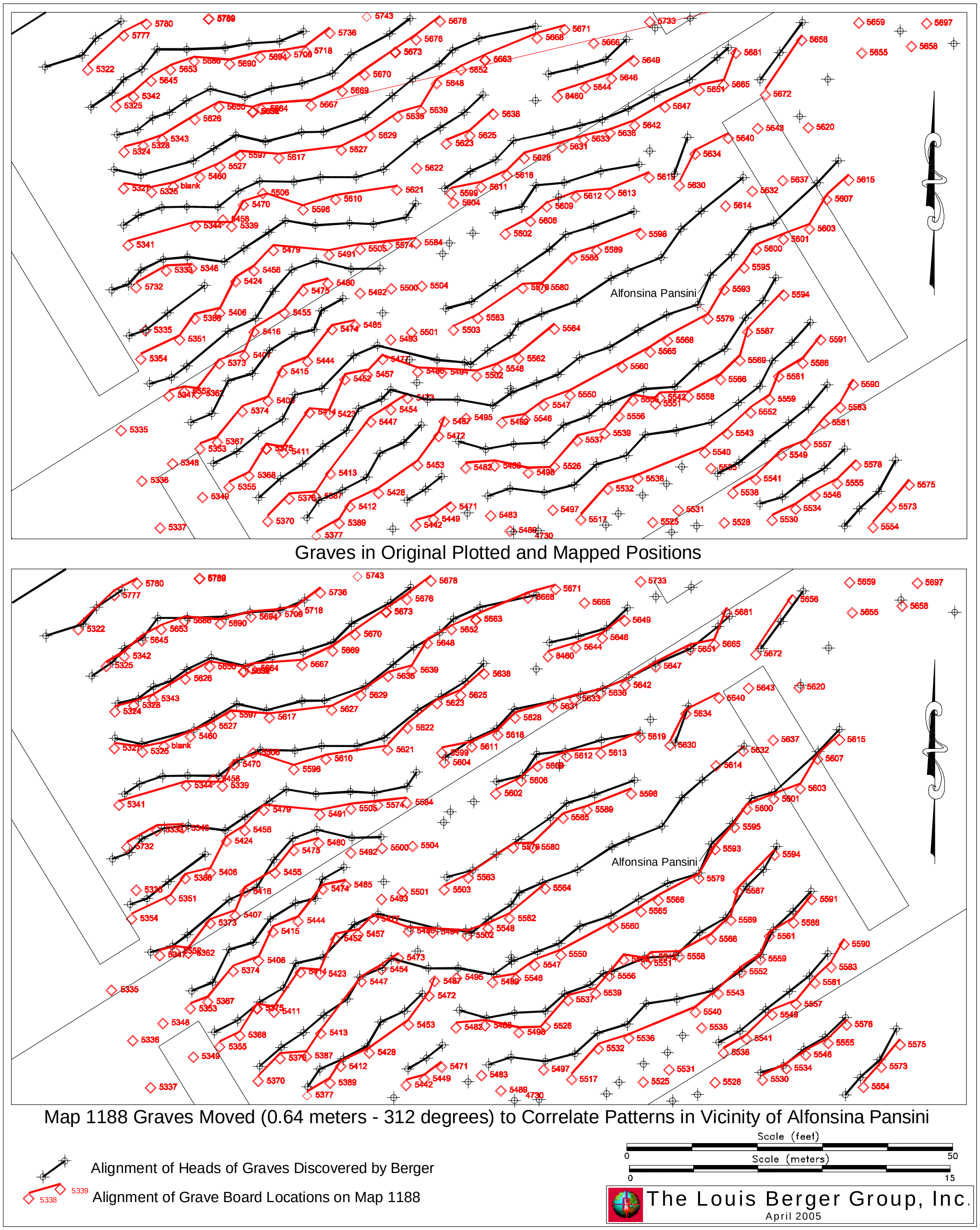


FIGURE 7-16: Illustration Showing How the Process of Moving Cartographic Layers Clarifies the Correlation Among Burial Patterns

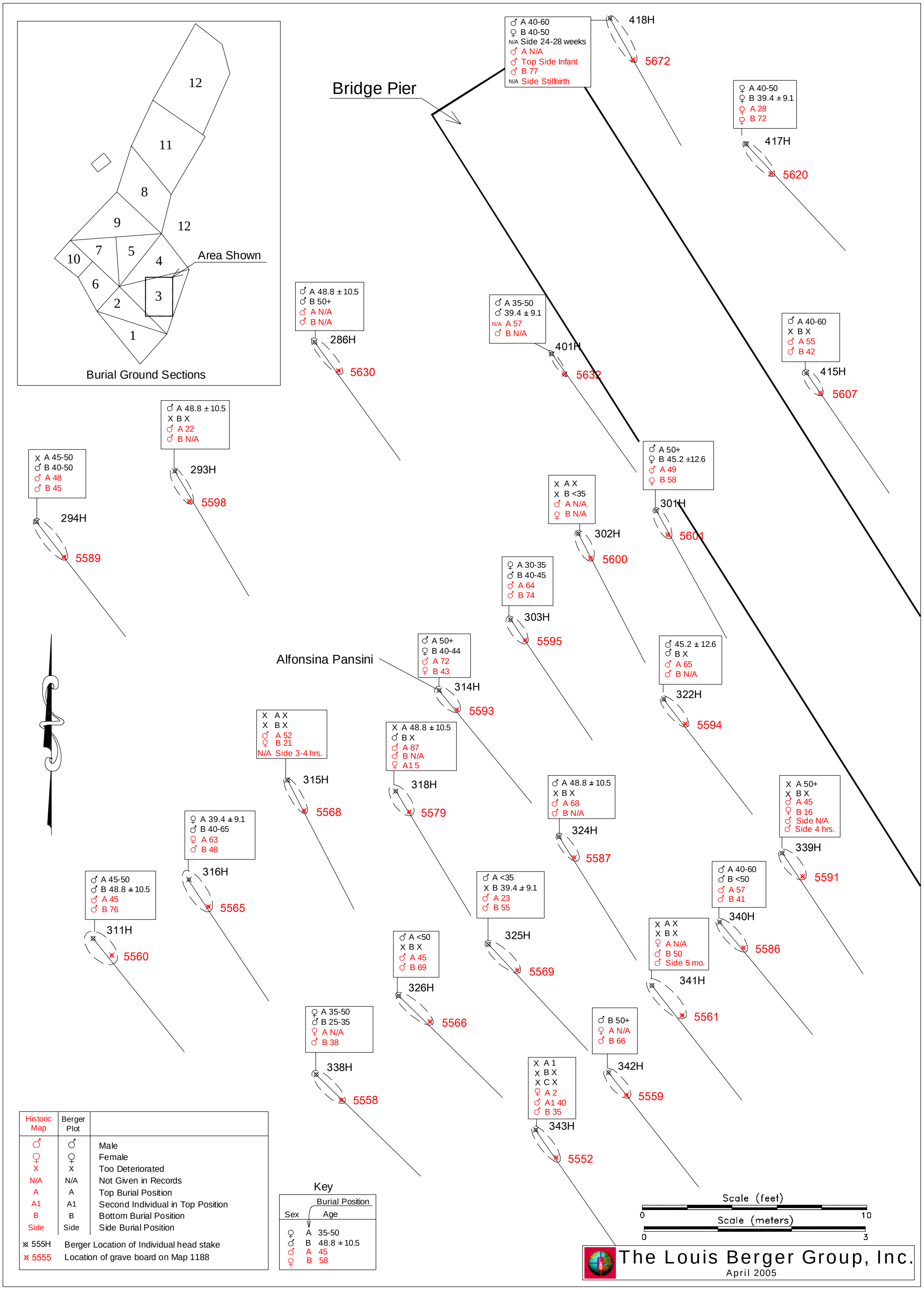


FIGURE 7-17: Spatial Relationships and Burial Characteristics Used to Identify a Single Burial (Alfonsina Pansini)

PLATE 7-36: North Elevation of Cemetery Office Facing New County Road

PLATE 7-37: South Elevation of Cemetery Office

PLATE 7-38: West Elevation of Cemetery Office

while the distance between two of these features was roughly 3 feet (slightly less than 1 meter). This feature was interpreted as a fence line with a gated entrance (Plates 7-39 and 7-40).

Additional soil stripping in this area of Potter's Field revealed 10 circular soil stains ranging in diameter from 13.7 inches (35 centimeters) to 23.6 inches (60 centimeters), arrayed at regular intervals, and extending for about 59 feet (18 meters). These soil stains are the organic remains of tree roots. An aerial photograph of the project area taken in 1950 just prior to the construction of the Turnpike shows this tree line, and though difficult to resolve individual trees at the scale of the photograph, the arc of vegetation is clearly visible. A 1940 county engineering map titled "Revised Landscaping for Laurel Hill" depicts approximately forty Lombardy poplars forming a rectangle around the perimeter of the burial ground. Whether this plan was ever implemented is unknown for no evidence of these trees was found. To the southwest of the tree line, a curved dry-laid stone wall with an earthen fill interior may have framed a small ornamental garden (Plate 7-41 thru 7-44).

Finally, a subterranean iron tank with concrete cap was discovered 6.5 feet (2.0 meters) from the southwest corner of the cemetery office. The tank was cylindrical and its dimensions were roughly 6x3x2.5 feet (1.8x1.0x0.8-meters). A four inch diameter iron pipe discharged from the tank and extended 14.7 feet (4.5 meters) to the west at a slight downslope gradient. This feature was most likely a septic tank set below a privy.

PLATE 7-39: Top of Brick Footer In Situ

PLATE 7-40: Brick Footer

PLATE 7-41: Discovery of Dry Laid Stone Wall

PLATE 7-42: Curved Stone Wall Feature


PLATE 7-43: Stone Wall Feature


PLATE 7-44: Buried Brick Feature

G. MEADOWVIEW HOSPITAL GRAVE MARKERS

Berger mapped, recorded, and collected grave markers in a fenced, vacant lot and wooded area northeast of the Meadowview Hospital Complex in Secaucus, Hudson County, New Jersey on behalf of the Turnpike Authority and in consultation with Hudson County. Berger accomplished this work on July 22 and 23, 2003. The work was prompted by a citizen's report that cylindrical grave markers were observed within the Hudson County administrative office complex several years prior.

The grave markers are located in two areas. One group includes 68 *in situ* markers arranged in three rows, approximately 6.56 feet (2.0 meters) apart, trending east-west. Within each row, the markers are separated by approximately 2.3 feet (0.7 meters) intervals. Twenty-six additional, uninstalled markers were scattered in the wooded area north of the aforementioned rows. The markers were, undoubtedly taken from Potter's Field for unknown reasons as all the four-digit numbers impressed on the cylinders corresponded with grave numbers listed in the Hudson County Burial Registers.

Each marker is a about 3 inches (0.08 meter) in diameter with a hollow concrete cylinder ranging in length between 12 and 18 inches (0.31 and 0.46 meters). Each cylinder has a porcelain disk affixed to one end by means of a protuberance on the underside of the disk that was inserted into the hollow cylinder. Each ceramic disk is impressed with a four-digit number though some are broken and only partially legible. Each *in situ* grave marker had been installed, ceramic disk down, in a post hole containing a small amount of concrete at the bottom. The concrete adhered to the marker and had to be removed to expose the number on the ceramic disk. Concrete had been applied to the upper, exposed end of each cylinder and painted white.

In conjunction with Berger's work, Hager-Richter Geoscience, Inc. conducted a non-intrusive remote sensing survey of the ground below the markers using ground penetrating radar (GPR). The GPR was employed to explore for subsurface features that might indicate the presence of human remains. Hager-Richter's findings were inconclusive.

A full report of the work completed at the Meadowview campus facility is contained in Appendix D of this report.

H. GEOPHYSICAL SURVEY (REMOTE SENSING)

Hager-Richter Geoscience, Inc. conducted a geophysical survey at Potter's Field in July, 2003 (Appendix E). The scope of the project and areas of survey were specified by Berger. The main objective of the geophysical survey was to detect possible grave shafts and related archaeological artifacts. Berger also suggested that several geophysical methods be tested to determine which method(s) might provide more useful information about subsurface conditions at the Potters Field site. Berger also requested the survey to establish the efficacy of remote sensing, at all, in heavily disturbed soils. The geophysical survey was conducted in six areas of interest designated as Areas 1 – 6 (see Figure 7-12 and Plates 7-45 and 7-46). Berger established on-site survey control and provided baseline information to Hager-Richter for each survey area. The areas of interest represented varying surface conditions and levels of known subsurface conditions. The geophysical methods included ground penetrating radar (GPR), time domain electromagnetic induction metal detection (EM61), frequency domain electromagnetic induction with two different instruments (EM38 and EM31), and magnetics. Not all of the methods were used in each area of interest due to access and time limitations. Reconnaissance geophysical surveys were conducted in Areas 1 - 4 using various non-intrusive geophysical methods. The GPR method was the only method used in Areas 5 and 6.

With regard to the relative effectiveness of the geophysical survey methods used, Hager-Richter concluded:

- The GPR and EM61 methods provided the most useful information about subsurface conditions at the Potters Field site.
- Surface conditions in the survey areas greatly affected the quality of the geophysical information that could be acquired.

With regard to the geophysical results by survey area, Hager-Richter concluded:

- Area 1 – Several areas of disturbed ground and buried metal are present and might correlate with the presence of grave shafts.
- Area 2 – The geophysical data were so affected by irregular surface conditions and surface metal that independent information about subsurface conditions could not be determined. The known grave shafts could not be detected reliably.
- Area 3 – The presence of fill containing metal and debris over the level of the former Potters Field prevented the detection of grave shafts under the fill.
- Area 4 – Small amounts of buried metal are widely distributed throughout the survey area in an array that might be expected for personal artifacts in grave shafts.
- Area 5 – Several areas of disturbed ground are present and might correlate with the presence of grave shafts. A faint linear feature crossing one corner of the area was detected at the expected location of the edge of grave shafts.

PLATE 7-45: Geophysical Survey Equipment

PLATE 7-46: Geophysical Survey

- Area 6 – Several areas of disturbed ground are present and might correlate with the presence of fill used in the construction of the detention center. Whether the fill in the areas of disturbed ground contains features of archaeological interest could not be determined.

Ground-truthing of the results of the geophysical survey occurred as a matter of course through the stripping and exhumations and demonstrated that the survey did not result in positive identification of any burial features. This is not to say that the methodology is not generally useful, but, rather, that the conditions at Potter's Field were not conducive to success. In fact, Berger suspected, from start, that the remote sensing of subtle archaeological features (burials and grave shafts) through imported soils with high iron content containing metal and other debris was unlikely. Nevertheless, had the methodology worked, Berger's search for individual burials and burial ground boundaries would have been greatly assisted.

I. SUMMARY DISCUSSION

Berger's disinterment of the individuals at the Secaucus Potter's Field was preceded by extensive review and analysis of available cartographic and archival evidence. Initial estimates by the Turnpike Authority suggested that Potter's Field was used between 1923 and 1962 and contained approximately 1,200 graves containing approximately 3,500 burials or 2.92 burials per grave. The Burial Register listed 9,781 burials in 5,641 graves for an average of 1.73 burials per grave interred between 1880 and 1962. Two other Hudson County burial grounds were shown on early historic maps but their relationship to Potter's Field and to the final resting places of individuals listed in the Burial Register were not, and as a result of this project are still not, clearly understood.

Berger located and disinterred the remains of 4,571 individuals from 2,693 original graves and reburial locations. The average number of burials per grave located by Berger was 1.70. An unknowable number of additional individuals were undoubtedly interred in Potter's Field but were either displaced by construction activities subsequent to the abandonment of the burial ground or were completely decomposed and unidentifiable. Indeed graves were identified that contained no identifiable human remains though a few of these contained artifacts evidencing that they had once contained human remains.

At the inception of the project, no surface evidence of the burial ground survived in the field, except for the ruins of the cemetery office. Berger, therefore, approached the project as a phased archaeological exploration testing the several hypotheses concerning the location, contents, and period of use of Potter's Field suggested by the archival and cartographic evidence. The null hypothesis (i.e., that no burial grounds were present) was rejected prior to Berger's field work because an earlier archaeological survey Greenhouse (1996) had identified human remains.

The location of the boundaries and numbered grave locations in several areas of Potter's Field had been mapped by Hudson County during the period of use of the burial ground. Berger's exposure and mapping of actual graves and section corner markers demonstrated that the available maps were fairly accurate representations of the locations of the features they depicted. The maps, however, contradicted the hypothesis that the use of Potter's Field began in 1923 as they depicted numbered graves dating from 1916. In addition, the available maps did not include the midsection of the burial ground where many graves were located by Berger and subsequently dated to between 1905 and 1913. These data evidenced that the burial ground was in use at least eighteen years prior to the Turnpike Authority's initial estimates.

Where the locations of numbered graves depicted on the maps correlated well with those located by Berger in the field, the contents of the graves usually correlated well with their contents as listed in the Burial Register. Map correlations with the Burial Register and recovery of name and number plates contributed to Berger's identification, by name, of 825 individuals from completely unmarked graves. Identification of individuals buried in 1895 forced the rejection of the revised hypothesis that the use of Potter's Field began early in the twentieth century.

The actual period of use of Potter's Field is not known with certainty nor can the number of individuals that were actually buried there be determined with accuracy. The meticulous archaeological methods employed by the Berger team ensured that Berger located all identifiable human remains and burial features (graves) that existed at the time the disinterment fieldwork was undertaken.

Berger's field work also revealed, in considerable detail, the sequence of use of the burial ground (Figure 7-18). The evidence suggests that the earliest use of the burial ground was in the southwestern portion and that use progressed from the southwest to the northeast until March 10, 1923. Probably during early 1923, the southwestern portion of Potter's Field was prepared for re-use by importation of fill to accommodate interment of remains above those already in place. Interment of individuals began anew in the extreme southwestern portion of the burial grounds on March 13, 1923 in the imported fill. The interments again progressed in a northwestward direction until Potter's Field's abandonment in April 1962.

In 1950 burials were removed from the proposed Turnpike bridge pier locations and reburied approximately 140 feet northeast of the, then active, northeastward end of the burial ground. That these reburials were interred in areas used for prior interments suggests that neither the Turnpike Authority nor Hudson County was aware of the spatial extent and long history of Potter's Field.

The disarticulated, intentionally aggregated skeletal elements found in Cluster No. 1 under the Turnpike bridge is fairly strong evidence that graves were unearthed somewhere in Potter's Field during a construction episode and were reburied in a trench to either hide evidence that construction was ongoing in a cemetery or to afford the displaced remains a "decent" reburial.

Other evidence for neglect and mass disturbance to Potter's Field included:

- gaps in the patterning of graves in the vicinity of ditches and the detention center and its fences;
- crushed and planed away portions of human remains in the vicinity of ditches and the detention center and its fences;
- complete lack of any *in situ* grave markers;
- notations on Map No. 769 concerning brush fires and deterioration of "headboards";

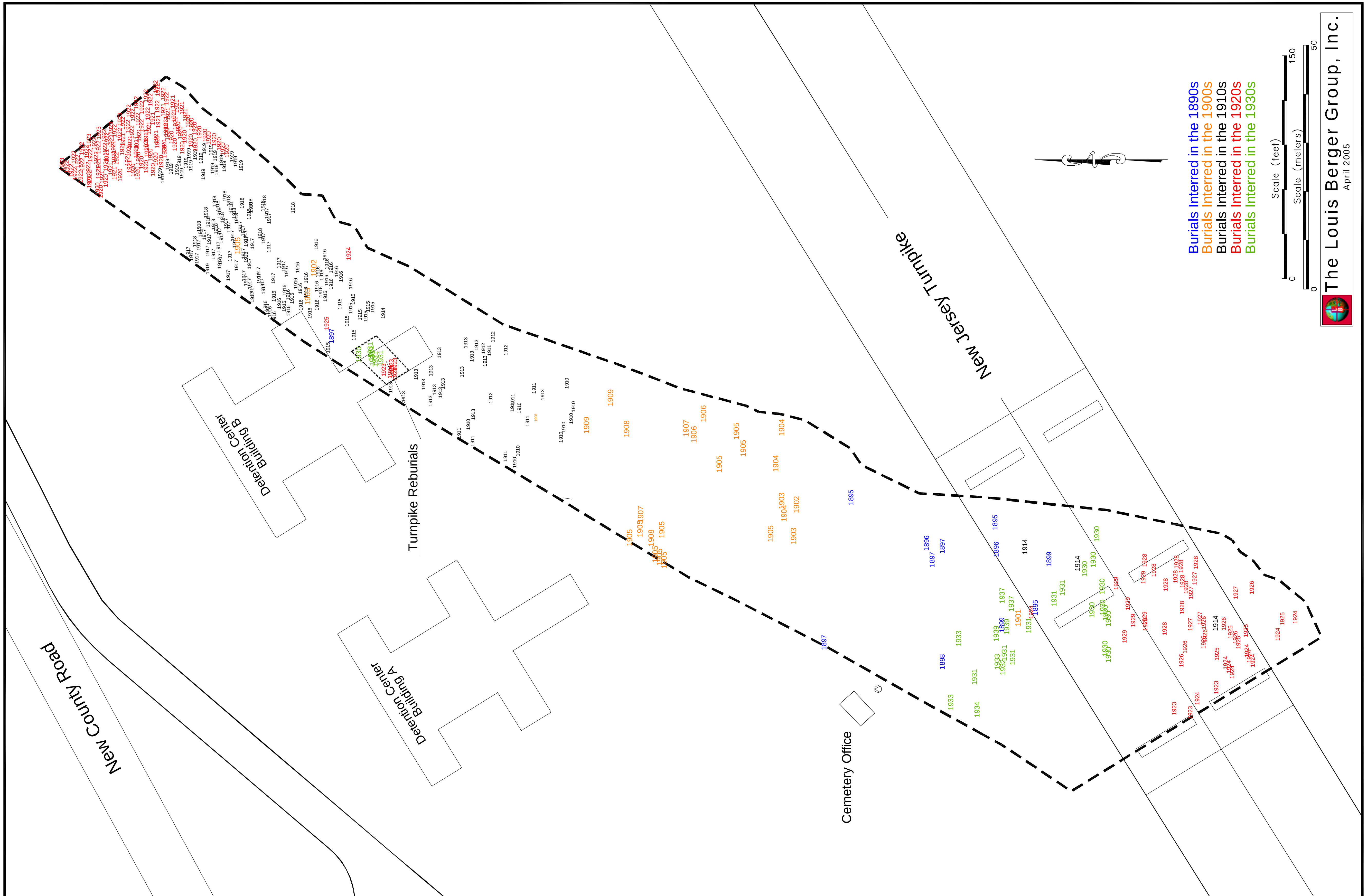


FIGURE 7-18: Locations of Dated Burials Within Potter's Field

- installation of five large concrete foundation blocks in the western end of the burial ground for a commercial billboard; and
- long term and recent use of Potter's Field as a landfill.

This evidence suggests that the abandonment of responsibility for the maintenance of Potter's Field began long before its actual abandonment in 1962. The evidence also suggests that a rather rapid loss of institutional awareness of the very existence of the burial ground began soon after its abandonment and was complete before the construction of the detention center in the early 1980s. Use of Potter's Field as a landfill until quite recently suggests that Potter's Field was completely forgotten until mandated research in advance of the proposed Turnpike Authority's interchange unearthed evidence for its existence. The interchange project resulted in a rebirth of awareness of Potter's Field and afforded the New Jersey Turnpike Authority and The Louis Berger Group an opportunity to tell part of the story of the 9,781 souls buried there.

Part of this story includes the surprising fact that the interred individuals were treated with dignity and respect by those responsible for their burial. Most were buried in well-made, though modest, coffins and were accompanied by, sometimes quite valuable possessions. This fact stands in contrast to Berger's dismal expectations forced by the neglected appearance of Potter's Field in early 2003.

PLATE 7-47: Overview of Potter's Field. Note all areas of exposed soil represents the boundaries of the burial ground referred to as Potter's Field.

CHAPTER 8. ARTIFACT/NON-SKELETAL OBJECT ANALYSIS

A. INTRODUCTION

As part of the initial planning process for the project, it was presumed that few artifacts or personal effects associated with the persons buried in Potter's Field would be recovered. This presumption was based upon the commonly held view that the burials represented a homogeneous group of destitute and nameless individuals with few personal belongings. As excavations and exhumations proceeded, however, this assumption was proven to be incorrect, and it was necessary to develop a procedure for the treatment, analysis, and cataloging of artifacts. The laboratory analysis procedures described below refer only to the artifacts. The human remains were treated and analyzed separately and are discussed in the following chapter of this report.

B. METHODS

In the field, artifacts or any nonhuman skeletal remains were bagged in 4-millimeter, resealable polyethylene bags and labeled with the burial number. The artifacts were then transported, with the human remains, to the on-site laboratory for check-in and sorting. Artifacts from each burial were counted and separated out into material classes and subtype. Non-diagnostic artifacts, such as coffin nails,, were counted and returned to the box containing the human remains. Diagnostic artifacts, such as coins, buttons, or medals, were segregated for further analysis by the historic archaeologist. This analysis sought to characterize the assemblage in regard to the types of artifacts recovered, including attributes of form and style, materials of manufacture, and date ranges. The artifact analysis of the Potter's Field assemblage was critical to the dating and identification of the associated burials. Information gleaned from the artifact analysis was cross-checked with available maps, and death certificate and burial record information, which, at times, led to the identification of the date of burial, age, gender, occupation, religious affiliation, ethnic background, or possible social standing of an interred individual.

In general, the analysis examined only individual artifact fragments, e.g., sherds, etc., and did not attempt to identify, reconstruct, or evaluate original whole objects, e.g., ceramic or glass vessels, etc. The principal reason for limiting the analysis to individual fragments was that the bulk of the assemblage was recovered through collecting small volumetric samples intended to be representative of the contents of individual burials. Such a sampling design was appropriate given that the predominant depositional context of the artifacts was individual burials within a grave shaft. Moreover, it appeared that most (and possibly all) of the excavated soils had undergone at least one and possibly several cycles of accumulation and deposition. Under these circumstances, identification or reconstruction of original whole artifacts beyond intra-burial units would not yield results that would provide much information about the historical and cultural context in which these objects were originally employed.

In some instances, depositional conditions necessitated extensive cleaning of metal artifacts to uncover any embossments or inscriptions. Some artifacts, such as newspapers, books, or cloth, required painstaking separation with dental tools to reveal any lettering or dates that could help with the dating or identification of the burial. Since all of the artifacts would be reburied with the deceased, selected and unique artifacts were photographed during analysis in order to create a permanent pictorial record.

Laboratory analysts recorded information for individual artifacts or groups of identical artifacts on paper data entry sheets that were then provided to the data entry clerk for input into the computerized data management system. The resulting information was compiled in Paradox 9, a relational database development package that runs on a Windows platform. In addition, the artifact inventory was regularly downloaded to the laboratory computer and converted to Excel for ease of data manipulation during analysis. A complete catalog of the recovered artifacts from Potter's Field is included as Appendix F.

C. ASSEMBLAGE OVERVIEW

A total of 113,579 artifacts were recovered from Potter's Field. The assemblage was divided into 22 major classes and 24 subtypes within classes (Table 8-1).

TABLE 8-1

SUMMARY OF POTTER'S FIELD ARTIFACT ASSEMBLAGE

MATERIAL CLASS	SUBTYPE	SUBTYPE TOTAL	MATERIAL CLASS TOTAL
Monuments			5
Grave Markers			29
Coffin-Related			60,634
	Coffin Nails	59,455	
	Coffin Wood Fragments*	31	
	Complete Coffins	4	
	Coffin Hardware	437	
	Coffin Handles	44	
	Coffin Plates	564	
	Burial Pillows	99	
Clothing			43,499
	Clothing Fragments	35,551	
	Apparel	32	
	Shoes and Boots	2,155	
	Collar Studs	100	
	Buttons	4,642	
	Miscellaneous	1,019	
Jewelry			340
	Rings	77	
	Earrings	29	
	Other	234	
Personal Belongings			514
	Eyeglasses	25	
	Harmonica Fragments	5	
	Writing Implements	112	
	Safety Pins	250	
	Purses/Wallets	27	
	Other	95	
Religious			204
Military Medals			15
Coins and Tokens			323
Paper Objects			281
Tobacco Pipes			194

Clay	148	
Other	46	
Toys		14
Ammunition		10
Personal Hygiene		181
Prosthetics		114
Glass		1,450
Ceramic		684
Faunal		18
Floral		17
Lithics		2
Miscellaneous- Modern debris		822
Unidentified Fragments		4,229
TOTAL		**113,579**

* In general, coffin wood was not cataloged given its extremely deteriorated and fragile nature.

The Potter's Field artifact assemblage is dominated by grave and coffin-related objects (N=53 percent) with coffin nails accounting for just over 52 percent of the overall assemblage (N=59,455). Approximately 40 percent of the assemblage consists of personal artifacts, with such diverse items as clothing, jewelry, personal belongings, religious, military medals, coins/tokens, pipes, and toiletries, to name a few. A notable component of the assemblage is medical-related items, such as medicine bottles, prosthetics, and surgical equipment, that reflect the relationship of the interred to the various medical facilities located nearby. Surprisingly, a variety of ceramics and vessel glass (N=2,134) were recovered from the burials, items not generally associated with historic burials. A very small percentage of the assemblage consists of non-human bone (N=18) and prehistoric lithic material (N=2). Much of the remainder of the assemblage (approximately 4 percent) consists of objects of metal, leather, and wood fragments that were either unidentified or were not categorized as to functional class. Overall, the recovered assemblage, aside from coffin nails, appears strongly oriented toward the personal effects of those interred at Potter's Field.

D. MONUMENTS

Based on the information depicted on the 1935 and 1940 survey maps of the Potter's Field, sections of the burial ground were delineated by the installation of "monuments" and labeled A thru H, J, and K. A total of five monuments (A, B, C, F, and either G or H) were discovered and collected from Potter's Field. In general, these monuments were four-sided, rough-quarried stone (diabase), ranging in height from about 2.03 feet (62 centimeters) to 1.47 feet (45 centimeters), with each face or side measuring about 0.65 foot (20 centimeters) (Plate 8-1).

PLATE 8-1: Recovered Monuments

E. GRAVE MARKERS

According to excerpts from local newspapers and a few survey maps of the burial ground, grave locations within Potter's Field were once marked by either "wooden boards" (sometimes described as head-boards) with numbers, or cylinders. The numbers inscribed on these markers were intended to correspond to the Burial Register "lot" numbers or grave "plot" number. The discovery of these markers would have assisted in the identification of individuals within graves at Potter's Field, but unfortunately no wooden boards were discovered during the excavations at Potter's Field, and only a few cylindrical grave markers were recovered. These markers consisted of an unglazed concrete shaft that measured about 24 inches in length with a center hole in which a glazed ceramic disk with a stamped number was inserted. A total of 27 numbered disks (Table 8-2) and several fragments of disks and/or shafts were recovered from Potter's Field (Plates 8-2 and 8-3).

PLATE 8-2: Cylindrical Grave Markers

PLATE 8-3: Ceramic Disk and Unglazed Shaft

TABLE 8-2

RECOVERED CYLINDRICAL GRAVE MARKER NUMBERS

642?	6370	6416	6470
?344	6373	6422	6491
?396	6377	6440	6494
6304	6397	6442	6507
6317	6398	6452	6513
6318	6403	6458	6535
6358	6409	6467	

Although Berger reviewed some of the voluminous Hudson County Institutional Complex administrative records, no specific purchase order requests or notes concerning the manufacture and/or delivery of either of these grave markers were identified. It is likely that the cylindrical markers were mass-produced in New Jersey, possibly at one of the Perth Amboy terra-cotta factories that produced these types from 1875 until 1930, perhaps the Seaboard Terra-Cotta Corporation or the Perth Amboy Terra-Cotta Company. Ceramic markers identical to those found at Potter's Field were found at the New Brunswick's Elmwood Cemetery, where they were used to mark the burials of indigents. The Elmwood Cemetery markers were a minimum of 1 foot long and approximately 3 inches in diameter and designed to be buried in the ground with only the glazed disk exposed (Veit 1995:9). In addition, similar four-digit numbered cylinders have been located behind the Morristown brick company in an area suspected to contain "scores of poor people from hundreds of years ago" (Weird NJ:54).

F. COFFINS

A review of funerary customs reveals that the use of burial containers for the deceased has a long and varied history. The earliest and often the simplest manner of burying the deceased was to wrap the body in a simple cloth or shroud cover. Historically, the earliest burial container in the U.S. was a hexagonal coffin. The hexagonal coffin form was used throughout colonial America and remained in use until the middle of the nineteenth century, when it was largely replaced by a rectangular form (Bell 1990; Kenny et al. 2003; LeeDecker 2001). Coffins were typically constructed by a local carpenter, cabinetmaker, or even wheelwright. Before beginning work the carpenter needed only a few measurements from the corpse. Generally, two measurements were sufficient—the length from head to foot and the width at the shoulders or elbows. The coffin itself was built of six pieces—bottom, head, foot, two sides, and top or lid, and the only tools required were a few saws, planes, a hammer, and various marking tools (LeeDecker et al. 1994).

Rectangular-shaped coffins came into vogue in the second half of the nineteenth century. It should be noted that there is a significant overlap between the use of hexagonal and rectangular-shaped coffins, with the latter supplanting the former after about 1850 in many areas. It is possible that rectangular coffins were first used for children's burials. This style was also periodically used as an outer box to encase an interior hexagonal coffin (Kenny et al. 2003:87).

During the Victorian era of beautification and elegance, the term *casket* was adopted to describe these new-styled rectangular coffins initially made by William Smith of Meridian, Connecticut (Coffin 1976:101). Prior to that era the term *casket* referred to the containers or small caskets that held precious items, such as jewelry and valuables (Museum of Funeral Customs 2005). As such, a new funerary business devoted to the adornment and ornamentation of the burial container, the casket industry, was formed.

Up until about 1835 coffins were made almost exclusively of wood. Around that time patents were secured for such materials as poured cement, stone, marble, and metal (Coffin 1976:105). By 1860 even more experimental coffin materials, such as iron, zinc, potter's clay and glass, had been patented. This trend continued into the twentieth century, with coffins made from aluminum, papier-mâché, and vulcanized rubber receiving patents (Coffin 1976:107). None, however, would replace the practicality of wood, particularly during the epidemics of the late nineteenth/early twentieth centuries, when the need for functional boxes in great quantities superseded any aesthetic considerations. Some wooden boxes, however, did have certain additions to add aesthetic appeal to the otherwise simple design (Coffin 1976:100).

Since coffin preservation at Potter's Field was generally very poor, only limited data and information could be retrieved and recorded. Approximately 50 percent of the coffins were too deteriorated to determine shape (N=2,349), and 171 burials had no discernible evidence of a coffin. The remainder, however, exhibited a diverse range of shapes, designs, and materials. Among the identifiable coffin shapes were hexagonal (N=1,179), rectangular (N=621), and tapering (N=245), as well as a few unique coffins (N=6).

The hexagonal shaped-coffin represents the most common form discovered at Potter's Field (Table 8-3; Plate 8-4). Interestingly, the majority of the coffins at Potter's Field were hexagonal during a time when the national trend was clearly toward the use of rectangular coffins and had been for at least a quarter century prior to the first interments at Potter's Field in the 1880s. Typically, these hexagonal coffins were constructed of eight wooden boards nailed together. Six boards formed the sides of the coffins with one additional board for the bottom and another for the lid of the coffin (Plate 8-5). A variation of the eight-board hexagonal-shaped coffin was the six-board coffin with accordion-pleat style shoulder construction (Plates 8-6 and 8-7). By cutting a series of narrow vertical incisions along the interior sideboards of the coffin, the carpenter or coffin-maker would have been able to flex or bend the boards to a near-hexagonal shape.

TABLE 8-3
SELECTED COFFIN DIMENSIONS, POTTER'S FIELD

BURIAL No.	COFFIN SHAPE – DETAIL	LENGTH*	WIDTH* AT HEAD	WIDTH* AT FOOT	MAXIMUM WIDTH*
11,001A	Hexagonal – accordion-incised	5.90 (180)	0.95 (29)	0.68 (21)	1.70 (52)
11,002B	Hexagonal - accordion- incised	5.87 (179)	1.08 (33)	0.78 (24)	1.73 (53)
11,005A	Hexagonal – accordion-incised	6.03 (184)	0.98 (30)	0.68 (21)	1.60 (49)
11,311B	Hexagonal – accordion-incised	5.83 (178)	0.82 (25)	0.65 (20)	1.54 (47)
11,317B	Hexagonal – accordion-incised	5.97 (182)	1.04 (32)	0.75 (23)	1.47 (45)
11,314A	Hexagonal – accordion-incised	6.00 (183)	1.04 (32)	0.85 (26)	1.37 (42)
15,451B	Hexagonal	5.90 (180)	0.82 (25)	0.65 (20)	1.44 (44)
15,434A	Rectangular	6.29 (192)	1.67 (51)	1.67 (51)	1.67 (51)

* Measurements given in feet (centimeters)

PLATE 8-4: Hexagonal Shaped Coffin Base

PLATE 8-5: Eight Board Hexagonal Coffin

PLATE 8-6: View of Accordion-Pleats

PLATE 8-7: Shoulder Construction of Six Board Coffin

One of the most interesting wooden coffins recovered from Potter's Field was an intact wooden child's-sized coffin (Plate 8-8). Although the coffin was intact and sealed, Berger's osteologist delicately loosened the lid to inspect and record the gender, age, and stature of the remains. Surprisingly, the coffin did not contain a child's skeletal remains but rather one single amputated limb of an adult. This startling discovery heightened the awareness of team members as to the need for careful inspection of all objects within the grave so as to obtain a true and accurate record.

Another noteworthy coffin-related discovery was revealed during the excavations of Burial 793A. Excavation of this burial recovered approximately 100 fragments of satin. Since the burial contained no visible clothing attributes, the historic archaeologist further examined the fragments to determine the satin's original function. This examination revealed that there were numerous holes in the fabric that presumably could have been made from tacks securing the fabric to the walls of the coffin. As such, it was determined that these fragments represented the lining of the coffin. An examination of the interior of the hem further suggested that the original color of this satin might have been lavender.

Other notable coffins or burial containers recovered at Potter's Field included a wooden coffin lined with white sheet metal, probably tin from Burial 15,539A (Plate 8-9), and a sealed glass Mason jar with the remains of a fetus in formaldehyde recovered from Burial 10,011A.


PLATE 8-8: Wooden Child's-Sized Coffin


PLATE 8-9: Metal Lined Wooden Coffin

The most unusual coffin discovered at Potter's Field was a steel coffin with a glass viewing plate known as a "Ziegler Case." The Ziegler case, measuring 6'7" in length, 2'1" in width, and 1'3" in height, was recovered from Burial 1,000B (Plates 8-10 and 8-11). It was severely rusted, dented, and partially crushed. Inspection of the exterior of the Ziegler case indicated that 22 clamps once secured the lid and a small exterior hinged steel door once protected the glass viewing plate. Ziegler boxes or cases were often used to transport remains long distances, for example, from Europe to the U.S. during World War I (personal communication, Jeffrey Macanka, mortician). Multiple latches around the edge of the lid secured the remains for transport and the viewing plate allowed the next of kin to positively identify the deceased. Once the deceased was transferred to the next of kin at the place of destination, the undertaker would re-use the empty box for any deceased indigents, sometimes placing more than one body within the metal coffin.


PLATE 8-10: Overview of Ziegler Case


PLATE 8-11: Ziegler Case

G. COFFIN HARDWARE

The majority of the coffins from Potter's Field fall into the utilitarian category, with no extraneous ornamentation; however, there were several notable exceptions. Although taphonomic conditions may have played a role in the presence/absence of coffin hardware, such as handles, it is probable that most of the coffins simply had no hardware aside from the structurally necessary coffin nails. Rather, coffins could simply be lowered into the ground using ropes or straps. Therefore, the presence of even the most nondescript and functional hardware may be looked upon as a departure from the usual equipage used at Potter's Field.

A total of 59,936 pieces of coffin-related hardware were recovered from Potter's Field. Of these the vast majority (N=99 percent) consisted of coffin nails, totaling 59,455. In addition, a total of 44 handles and 437 fragments of other coffin-related hardware were also recovered and inventoried.

A set of four cast iron loop handles was recovered from Burial 368B (Plate 8-12). Although this burial could not be definitively identified, it likely dates to between 1926 and 1928. The handles recovered from this burial are similar to ones advertised in the 1865 Russell and Erwin hardware catalogue. The fact that coffin hardware was being mass-produced and advertised in a national catalogue is testament to the commercialization of funerary rites that began in the late nineteenth century and continued into the twentieth century.

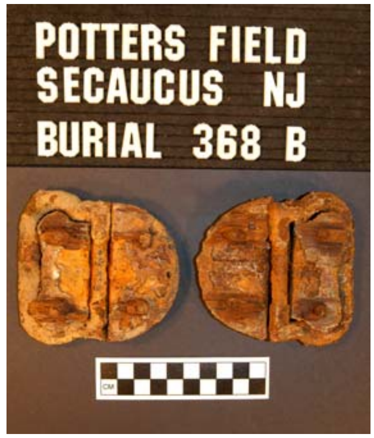


PLATE 8-12: Cast Iron Handles

Another example is the coffin from Burial 135A, which had a significant amount of ornate hardware (Plate 8-13). This consisted of non-functional trim in elaborate fleur de lis designs as well as ornamental teardrop and scalloped coffin handles. The material was a copper alloy with silver plating. Interestingly, this burial likely dates to late 1929, a time of great economic uncertainty at the onset of the Great Depression. Although it cannot be proven, it is possible that this individual may have been a person of means who was interred at Potter's Field as a result of medical circumstances rather than financial hardship.

A second coffin with elaborate trim was recovered from Burial 15,365A (Plate 8-14). This burial was identified as Suenna Mitchell, who died on March 21, 1921, in the Tuberculosis Hospital. The coffin hardware consisted of silver-plated lead or pewter knobs and brackets. The knobs were set on opposing ends of a wooden rod, secured on movable loops that were attached to the side of the coffin. Since this individual died while in the Tuberculosis Hospital, the presence of a decorative coffin may partially support the interpretation that fear of contagion, rather than financial insolvency, was the motivation behind at least some of the Potter's Field interments.


PLATE 8-13: Decorative Coffin Hardware


PLATE 8-14: Ornate Coffin Knobs and Brackets

A third example of decorative coffin hardware was recovered from Burial 15,394A (Plate 8-15). This individual was identified as George Wilson, who died on April 28, 1922, in Newark. The hardware consisted of two brass hinges with incised line decorations. Similar pieces, described as "butts" or "dowels" were advertised in the *1865 Russell and Erwin Hardware.*

PLATE 8-15: Brass Hinges With Incised Line Decorations

H. COFFIN PLATES

Given the lack of grave markers, one of the most fortuitous discoveries at Potter's Field were coffin plates. Coffin plates are "generally made of a soft metal like pewter, silver, brass, copper, or tin and are decorative adornments attached to the coffin that contain information about the deceased" (Schulze n.d.). At Potter's Field these came in a variety of styles and material types and appeared to be affixed over the breast area of the coffin lid. In addition to sometimes providing the identity of the interred, these plates occasionally indicated the date and place of death, along with the undertaker who prepared the remains for burial.

The most common type of coffin plate discovered at Potter's Field was a rectangular-shaped copper alloy sheet with a stenciled number opening. Some had chamfered corners and were attached to the coffin with small wire nails or tacks. The vast majority (N=133) also had the letters "T.H." stamped below the number, which was composed of two, three, or four digits (Plates 8-16 and 8-17). At first the significance of these letters was unclear. One theory was that it represented an abbreviation for patients from the tuberculosis hospital. Another was that it represented a particular locality, such as "Town of Harrison" or "Town of Hoboken." However, a thorough examination of the Burial Register combined with historic documentary research, particularly the city business directories, suggested that these were the initials of Thomas Hughes, an undertaker and coroner from Jersey City who operated from 1893 until 1915. Comparison with the burial records indicated that all of the burials with T.H. plates originated in Jersey City. The preservation of these types of plates varied from intact specimens to faint impressions left on the surface of the coffin wood (Plate 8-18). On some coffins only a portion of the numbers was legible, i.e., 5_1, or _23. In these cases the complete number could sometimes be determined by comparing osteological information with data from burial records.

PLATE 8-16: Two Digit Coffin Plate

PLATE 8-17: Three Digit Coffin Plate

PLATE 8-18: Coffin Plate In-Situ

PLATE 8-19: Undertaker A.J. Volk Coffin Plate

Another common type of coffin plate was a white metal plate that contained stamped numbers, the deceased's name and the mark "A.J. Volk" (N=35) (Plate 8-19). Review of the undertakers listed in the city business directories indicated that this plate represented Andrew J. Volk, who was an undertaker and coroner in Hoboken in 1903. Unlike the Hughes plates, A.J. Volk plates had the complete name of the deceased in small lettering under the burial number. These were often valuable in identifying the interred, even when the letters were illegible, as was often the case. If only a percentage of the letters was discernible, the number of characters was used to compare names in the Burial Register for potential matches.

A third style of metal identification plate was a copper alloy sheet with a series of two or three numbers and the initials "P.G." or "P.J.G" (N=21) crudely punched into the surface (Plate 8-20). These plates were determined through examination of the Burial Register to represent Patrick J. Gorman from Jersey City. An examination of city business directories and burial records indicates that Gorman was an undertaker and transported remains to the Hudson County Burial Ground from April 1916 until December 1918. Secondary entries within the lines of the Burial Register indicate a numerical sequence starting with 28 and continuing through 282 associated with the name P.J. Gorman.

It should be mentioned that several plates had only hand-punched numbers with no identifying letters. An example of these was found in Burial 15,039A (Plate 8-21). This plate had the hand-punched number "27," which was determined through comparison with the Burial Register to represent the interment of Alfred Campbell, who died on April 17, 1916, in Jersey City. Further examination of the Burial Register indicates that J.J. McGuire, presumably another undertaker form Jersey City, is represented from January 1916 to December 1918 with a corresponding numerical series 1 through 145. Therefore, hand-punched coffin number plates "27" may be attributable to the undertaker J.J. McGuire as it does not correspond in style, type, or number series to P.J. Gorman.

PLATE 8-20: Undertaker P.J. Gorman Coffin Plate

PLATE 8-21: Punched Number Coffin Plate

Burials that were removed and reinterred by the Turnpike Authority in 1950 were represented by thin lead strips (N=32) with the name of the deceased stamped onto the surface (Plate 8-22). Preservation of these forms was generally good, with all inscriptions fully identified. These strips were attached to the coffin with a wire nail at each end.

Although the majority of the identification plates were generic and repetitive, two exhibited decorative properties beyond mere utilitarian ware. One such type was characterized as a rectangular white metal plate with a raised beaded border. The specimen from Burial 591B had the inscription "Anna Langer/ Died March 15, 1932/ Aged 56 Years" neatly engraved on the surface (Plate 8-23). Interestingly, the second specimen also exhibited a raised beaded border, but the name "Charles Rahm" appeared crudely scratched onto the surface (Plate 8-24). According to the Burial Register, Charles Rahm was buried at Potter's Field on July 16, 1930, having died in Union City. Although it is unclear why one plate was carefully prepared and the other seemingly expedient, it is likely that it relates to the place of death (Hoboken versus Union City, respectively), possible expediency of burial, and/or monetary means at the time of death.

PLATE 8-22: Turnpike Authority's 1950 Reinterment Coffin Name Plate

PLATE 8-23: Coffin Plate of Anna Langer

PLATE 8-24: Coffin Plate of Charles Rahm

Other, less informative coffin plates also were recovered from Potter's Field. Among these were stenciled coffin number plates with the letter "A." These plates included the number/letters 43A from Burial 11,482B and 46A from Burial 1,059B, among others (Plates 8-25 and 8-26). One of these coffin number plates (43A) was determined to match the Burial Register for historic plot 3822 for an individual from Jersey City who died in 1902. Although the notation 46A is not listed in the Burial Register, the number/letter series 1A through 93A all correspond to the period September 1901 to September 1902 and all from Jersey City.

Another type or style of stenciled coffin number plates had no accompanying letters, such as 603 from Burial 11,470A (Plates 8-27). Comparison between the results of the osteological analysis and the Burial Register determined that this coffin plate was associated with historic burial plot 4724, representing an individual from Jersey City who was buried in 1914. Finally, a small quantity of large plastic or aluminum numbers, some affixed to wood fragments and some completely unattached, were also recovered (Plate 8-28). These included Burial 329A from Hoboken in 1926, Burial 407A from Secaucus in 1925, and Burial 340A from the Tuberculosis Hospital at Snake Hill in 1928. Given the limited occurrence of these coffin plate fragments, no apparent nor presumed correlation could be determined.

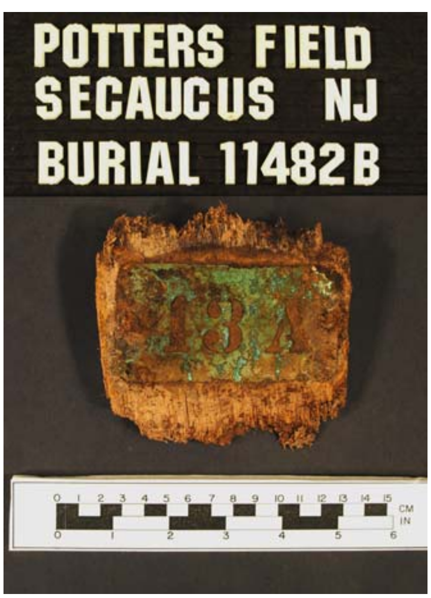


PLATE 8-25: "A" Letter Coffin Plate

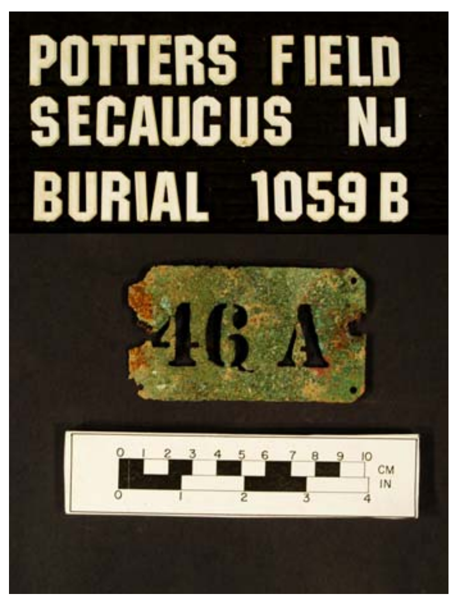


PLATE 8-26: "A" Letter Coffin Plate

PLATE 8-27: Stenciled Coffin Number Plate

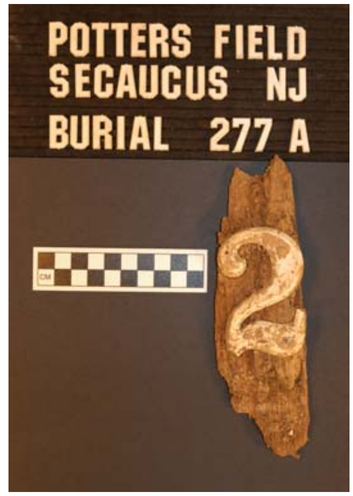


PLATE 8-28: Plastic Number Affixed to Coffin

I. BURIAL PILLOWS

Additional burial accouterments consist of a variety of pillows used to position and steady the head prior to burial. The use of a pillow appears to have been a means of keeping the jaw of the deceased from opening by propping up the head and allowing the chin to rest on the collarbone. This was a departure from colonial practices, in which a strap or strip of cloth was secured around the head and under the chin to hold the jaw in place (Riordan, in press).

The most common type of burial pillow encountered at Potter's Field was standard architectural brick. A total of 88 bricks definitively used as burial pillows were recovered and inventoried. Most were complete, although several partial bricks also were utilized. Several had makers' marks, including Pardee Works No. 1/Perth Amboy, N.J. (N=6) (Plate 8-29); J.H. Gautier & Co., Jersey City, N.J., (N=4) dated 1921-1927; Homestead (N=3); B.J.& Co. (N=2); Special No. 1 (N=2); and Washburn (N=1) dated 1890-1938 (Plate 8-30). The use of bricks as pillows appears to have been a common practice between the years 1909 and 1918, according to a review of data from Potter's Field. Interestingly, only three of the 88 burials with brick pillows appear to be associated with surrounding towns. As such, it appears that the practice of using bricks as burial pillows may have originated within the institutional complex. Although bricks were the most common form of burial pillow, other materials were also discovered at Potter's Field. Among these were a bag of feathers from Burial 820B, a cloth bag filled with grass/straw from Burial 826A, a straw bundle from Burial 11,627A, pillow stuffing from Burials 754A and 1,087B, and a section of cloth folded to form a pillow from Burial 15,474B.

PLATE 8-29: Pardee Brick Burial Pillow

PLATE 8-30: Washburn Brick

J. CLOTHING

A total of 35,551 unidentifiable clothing fragments and 32 identifiable specimens of clothing apparel were recovered from Potter's Field. Clothing apparel ranged from small brittle fragments to nearly complete identifiable garments.

One garment of particular interest was a possible military uniform consisting of a shirt and trousers from Burial 804C (Plates 8-31 and 8-32). The shirt had a herringbone design and several copper sheet metal fragments, possibly a medal or epaulet. The trousers were made of heavy wool, with four pockets and belt loops. The trousers appeared to be gathered around the seat and thighs with a wide band piping down the side of each leg, similar to the "doughboy" style of the World War I period. Other identifiable garments include a dark blue cotton dress with ornate white plastic buttons from Burial 793A (Plate 8-33) and a cotton or linen hood-like fragment, possibly a shroud, from Burial 11,453A.

PLATE 8-31: Military Uniform Shirt

PLATE 8-32: Military Uniform Trousers

PLATE 8-33: Women's Cotton Dress

Although most of the identifiable burial garments appeared to be nondescript, work-type clothing, there were also examples of more formal attire. Burial 11,388A contained a complete set of formal shirt attire consisting of a celluloid collar and two cuffs. One had the stamp, "Celluloid Trademark/The Celluloid Co./Interlined Fifth Avenue." Celluloid collars and cuffs were offered alongside ones made from linen, and later, rubber, in catalogs of the late nineteenth/early twentieth centuries. Of the three, celluloid was the least expensive way of achieving the elegant look of perennially starched collars and cuffs. In addition to price, celluloid shirt accessories were purported to be more comfortable, waterproof, and held their shape better than those made from other material (Sears Catalogue 1897). Other items made from celluloid include approximately four square/rectangular sheets from Burial 15,097B. These may have been wallet photos bleached clear by the elements or clear wallet window lenses. An unusual celluloid object recovered from Burial 15,902B is a three-section, fold-out ruler. This piece had extensive markings: "P.J. Sullivan Leaf Tobacco 56 Fulton Street Brooklyn, N.Y. Tel. 1145 Main/Importer and Packer" with both English and metric measurements along each respective edge. The mark "Whitehead and Hoag Co., Newark, N.J. USA" was present on the opposite side. Interestingly, this is the same firm name that appears on a Monmouth Battlefield commemorative medal recovered from Burial 15,066B/C. The Whitehead and Hoag Company were major producers of buttons, buckles, and novelty and promotional items throughout the second half of the nineteenth century. This ruler was likely a promotional item given to purchasers of products from the P.J. Sullivan store in Brooklyn.

One of the more extravagant examples of women's formal dress encountered at Potter's Field was a beaded neckline from Burial 11,453A (Plate 8-34). This piece consisted of hundreds of small black beads sewn in a circular pattern and attached to the neck area of a formal dress. Although this individual was not identified, the surrounding burials indicate that this individual may have been interred sometime between 1898 and 1902. In addition, distinctive men's attire included belts, buckles, and suspenders as well as various hats (Plate 8-35).

PLATE 8-34: Beaded Neckline From Formal Dress

PLATE 8-35: Man's Leather Hat

K. SHOES AND BOOTS

A total of 2,155 shoes and boots were recovered from burials within Potter's Field. A significant number of leather shoes and boots were preserved in burials that maintained a consistently moist environment. Many consisted of nondescript men's work boots, such as those recovered from Burials 589B and 363B (Plates 8-36 and 8-37). However, there were also examples of stylish dress shoes found in both men's and women's burials. Examples of these are a pair of wing-tipped shoes from Burial 18A and a pair of navy blue, open-toed shoes from Burial 793A (Plate 8-38). The latter burial also contained an overtly stylish dress and accessories.

Eight of the burials contained remnants of infants' or children's shoes (Plate 8-39). Included among these were a pair of leather baby shoes from Burials 589B, 595A and 11,596A; a pair of leather children's shoes from Burials 981A, 11,496A, and 11,529A; and unidentified soles or heels from a child's shoe in Burials 11,214A and 15,852A.

PLATE 8-36: Men's Leather Work Boots

PLATE 8-37: Men's Ankle High Boots

PLATE 8-38: Women's Open-Toed High Heel Shoe

PLATE 8-39: Pair of Child's Leather Shoes

L. COLLAR STUDS

A total of 100 collar studs, a fastener consisting of two small discs on either end of a short bar or shank for fixing a collar to a shirt, were recovered from burials at Potter's Field. These came in a variety of materials, including plastic, glass, copper, gold, and ceramic. There was a range of designs, including plain, embossed, and inlaid. Although the overwhelming majority of the collar studs were plain, several specimens were clearly intended for fashionable display. Two collar studs recovered from Burial 11,035A had a concentric circle design on the base of the platform (Plate 8-40). The *Bloomingdale's Illustrated 1886 Catalog* advertised similar collar studs in gold and sterling silver, suggesting that the specimens recovered from Potter's Field were less expensive, utilitarian versions (Bloomingdale Brothers 1886:134). A single collar stud made of a copper alloy base with a mother-of-pearl inlay was recovered from Burial 878C. Perhaps the most impressive example was a solid gold stud with the stamp "Krementz 14K" recovered from Burial 15,835B (Plate 8-41). George Krementz was a prominent jeweler who first established his business in Newark in 1866 (Krementz 2004).

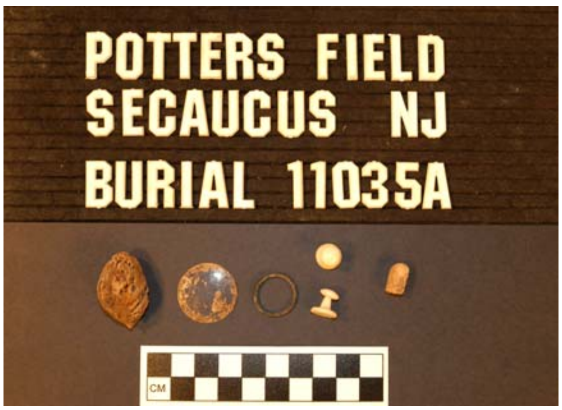


PLATE 8-40: Peach Pit, Glass Disk, Ring, Pressed Glass Collar Studs, and Lead Bullet Tip

PLATE 8-41: Solid Gold Collar Stud

M. BUTTONS

A total of 4,642 buttons were recovered from Potter's Field. The overwhelming majority were made of plain china or pressed glass four-way sew-through buttons. They consisted mostly of plain white forms, with one "piecrust" design also found (Plate 8-42). These buttons were first manufactured around the middle of the nineteenth century and were common fasteners on men's, women's, and children's clothing during the second half of the nineteenth century and early twentieth century. These forms may represent fasteners on standard issue clothing used in one or more of the institutions. In fact, the majority of identified burials that had glass buttons were associated with one of the various institutional facilities within the Hudson County complex at Snake Hill.

The types of buttons recovered from a burial often gave an indication of the clothing worn by an individual, and possibly the time and place of death. A number of buttons identified as overcoat buttons were recovered from Burials 39B, 262A, and 11,030A. The burial of an individual in an overcoat may be an indication of an autumn/winter time of death under circumstances that did not allow for traditional burial attire. Two work clothes buttons with the embossment "Sweet Orr" over a tug-of-war scene were recovered from Burial 291A. This button, traditionally found on denim work clothes, may be indicative of a male laborer without the means or familial ties for interment in more formal burial clothing.

A number of buttons were recovered that suggest the ability of the deceased to possess higher quality, stylish attire. Although most of the buttons were unadorned types made of either glass or hard rubber, a significant number came in a range of designs, particularly ones made of plastic. Burial 793A is notable for one particular ornate button type. Three white plastic buttons with a cobbled loop design were found attached to the deceased's dress (Plate 8-43). Other buttons recovered from the mixed context of Burial 793A/B included a copper alloy button with a raised dot design, a red plastic button, and a fragmented alabaster button. Another example of a possible decorative plastic button was recovered from Burial 935 A/B. This piece was convex in shape, with a thin vertical line background, geometric bar design, and raised rim. Burial 950B produced arguably the most elaborate buttons of the entire assemblage. A total of five were recovered, all black pressed glass (Plate 8-44). Three had a raised cross design with a beaded border. The remaining two had an impressed geometric leaf and flower design with a pinwheel border. A common style of glass and porcelain button consisted of a dome-shaped face with a metal shank. Burial 15,166A/B contained four identical dome-shaped buttons, all made of black glass with a floral design etched into the surface.

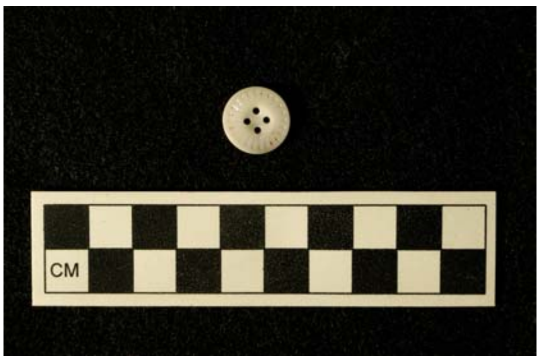


PLATE 8-42: "Piecrust" Design Button

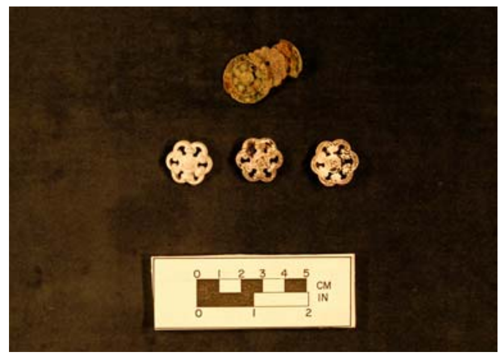


PLATE 8-43: Plastic and Copper Alloy Buttons

Among the most diagnostic of the button assemblage were the military buttons (Plate 8-45). A total of six were recovered: four from Burial 11,047A and two from Burial 11,044A. All of the buttons are characterized by a single design consisting of an eagle motif with the head facing left, a cluster of arrows in the right talon, and a branch in the left talon. A raised shield covers the body, and a sun over two banners is located over the head. The background of the button consists of fine raised horizontal lines. The raised line background had been eliminated by 1924, replaced by a smooth background (Lafranvoise 1976:116). Two sizes are represented in the button assemblage from Potter's Field: 0.9-inch-diameter, and 0.6-inch-diameter. Both sizes have loop shanks and were probably used on jackets and shirtsleeves, respectively. Both specimens from Burial 11,044A had the maker's mark "Johnson and Bole/Newark." Similarly, one of the specimens from Burial 11,047A had the stamp of an indeterminate Newark buttonmaker. A fragment of wool was also affixed to this piece. The city of Newark was a major buttonmaking center from the late nineteenth century, and was a major supplier of buttons to the United States military (Berger 2004). Based on the style of button and the temporal period of use, it appears that these may have been Army veterans of the Spanish-American War/World War I era (1898-1918).

PLATE 8-44: Black Pressed Glass Buttons

PLATE 8-45: Military Buttons

N. JEWELRY

Items such as rings, earrings, bracelets, and pocket watches were among the non-essential possessions recovered from Potter's Field. A total of 340 pieces of jewelry, including 77 rings and 29 earrings, were recovered and inventoried.

Among the rings the most common were wedding rings, which ranged from simple copper or brass bands (Plate 8-46) to elaborately carved, solid gold rings (Plate 8-47). At least two bands, one from Burial 15,924B and one from Burial 270B, had empty settings for real gems. Several had initials stamped inside the band, which at times helped to identify the individual interred in a particular burial. Some of these inscriptions were "CT 67" from Burial 604A (Plate 8-48), "14K OJH or DJH" from Burial 15,214B, "HB186_" from Burial 15,650B, and "WG 27/4/97" from 15,680A. Interestingly, the ring with the "HB" stamp was found with an individual identified as Charles H. Smith, who died on August 18, 1911, at the age of 74. This would have placed Smith's age in the 1860s (the date on the ring) at between 23 and 33 years old, which would be a typical age for marriage during that time period. An examination of the burial records and location of the burial near other identified burials indicate that the ring with the initials "WG" from Burial 15,680A belonged to William Gundersen, who died on April 29, 1912.

PLATE 8-46: Wedding Rings

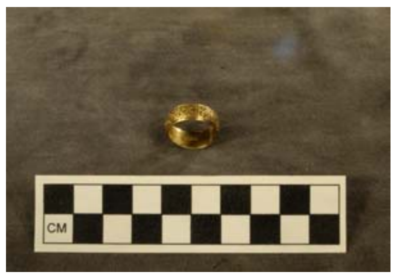


PLATE 8-47: Gold Wedding Ring

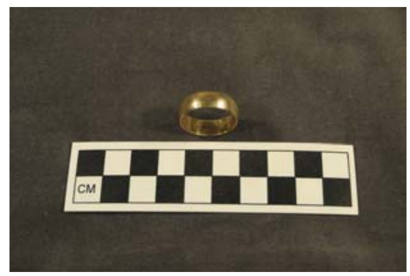


PLATE 8-48: Engraved Wedding Ring

Other rings provided an indication of the ethnicity of the deceased. Rings with a "claddagh" were recovered from Burials 290A and 410A. These rings originated in Ireland in the seventeenth century but became popular outside of Ireland in the second half of the nineteenth century, particularly with the mass exodus from Ireland resulting from the famine of the 1840s. They became family heirlooms and were passed down from mother to daughter. Burial 290A has been identified as Gertrude Voght, who died on December 19, 1928.

Purely decorative rings of gold, silver, and brass, set with a variety of gemstones, were recovered from a significant number of burials at Potter's Field. Gemstones were both real and artificial, and could by identified as such even if the stone was missing. The artificial gems were usually glass or "paste" materials over various colors to simulate the look of real stones. Paste, or "strass," is a form of faux gemstone invented around 1734 in France, which simulated the look and cut of diamonds and other colored precious and semi-precious stones for a fraction of the cost (Albert and Kent 1949:4; Houart, 1977:87-89). In cases where a ring was missing a stone but the back of the setting was opened, it was determined that the stone had been genuine. Conversely, when the back of the setting was closed, the stone would have been artificial. Some of the more unusual examples consisted of a sterling silver ring in the shape of a snake (Plate 8-49) with an oval terminal and a faux ruby from Burial 337A, and a pewter ring with a garnet center stone flanked by two turquoise stones from Burial 734A.

Perhaps less symbolic than the rings but equally ornamental were the large amount of earrings found within the burials at Potter's Field. Interestingly, the majority of the earrings were overwhelmingly composed of precious metals, such as gold or silver, with a small number made from brass or a copper alloy with a silver or gold plating. Burial 740A contained 11 earring fragments representing at least five complete sets (Plate 8-50). An additional earring recovered from Burial 740A-B may also have originated in Burial 740A. These

PLATE 8-49: Sterling Silver "Snake" Ring

PLATE 8-50: Various Sets of Earrings

came in a wide variety of styles, such as silver hoop earrings, gold French wires with a faux ruby setting, brass twisted strip earrings, and dome-shaped amber glass earrings with a threaded closure. A separate, threaded closure may represent yet another set beyond those that were recovered intact. This burial was markedly different from all of the other burials that contained earrings in that sets that were not actually worn by the deceased were included with the burial before interment.

Identifiable gold earrings were recovered from at least seven other burials. Some of the more elaborate specimens included a French wire with a raised "S" on an oval background from Burial 15,161A, a French wire with a disk background and raised six-pointed star and empty setting for a faux stone and the stamp "10K" on the back from Burial 637A, a French wire with a round stepped disk and floral design with a small center black stone from Burial 1,032B, and a French wire with a diamond setting from Burial 15,010A. Interestingly, the latter burial was identified as an "Unknown Man" who died on September 1, 1916, in Jersey City. This burial underlay the grave of Mary Christensen, however, and it is therefore likely that this earring originated in the Christensen burial but drifted downward into the underlying grave after the former deteriorated beyond recognition.

Other notable earring styles included a pair of copper alloy stud earrings with unidentified stone settings from Burial 734A (Plate 8-51) and a pair of silver earrings consisting of a flat disk on a French wire hook from Burial 230A-B. In a twist of humorous irony, the former burial was identified as George Washington, who died on August 2, 1923, in the Hudson County Insane Asylum. The underlying burial was identified as Bertil M.P. Carlson, a 35-year old male. It is unclear why a male burial had a matched pair of pierced earrings; however, it is possible that they simply represent a keepsake from a female relation of the deceased.

A number of pocket watches were included in the jewelry group recovered from Potter's Field. Pocket watches were usually ornately inscribed and made from precious metals. A silver pocket watch with an inscribed back plate was recovered from Burial 278B (Plate 8-52). The stamp, "Ingersoll Watch Company/Made in USA," and several patent dates ranging from June 29,1909, to July 14, 1925, were present inside the watch. A second silver pocket watch with an intricate floral design was recovered from Burial 15,740B. Interestingly, there was a stylistic shift away from pocket watches to "strap watches" during the early twentieth century. Pocket watches were still advertised as "railway" watches, suggesting that their use and appeal was becoming more specialized, with merchants targeting specific occupations rather than the general public (Sears Catalogue 1927:724). It is therefore possible that twentieth-century burials containing pocket watches may represent individuals associated with the railroad industry.

PLATE 8-51: Broach, Rings, and Stud Earrings

PLATE 8-52: Silver Pocket Watch

O. PERSONAL BELONGINGS

Personal belongings accounted for 515 specimens in the Potter's Field artifact inventory. A list of items included in this category is presented at right.

Bag	Knife	Pencil
Box	Leather pouch	Pencil case
Case fragment	Lighter	Pencil eraser
Dish/fork/spoon	Luggage tag	Pill box
Eyeglasses	Matchbox	Ruler
Harmonicas	Mirror	Safety pins
Key	Pen	Sewing kit case
Key case	Pen quill	Wallet/purse

A total of 25 eyeglasses or eyeglass fragments were recovered and inventoried. Among these were two complete pairs of wire-rimmed eyeglasses affixed to a case along with five individual glass lenses, four of which still had a portion of the frame attached, from Burial 433AB (Plate 8-53). Other oval-shaped lenses with wire-rimmed frames were recovered from Burials 1,139A, 1,145B, and 15,837. In addition, a leather eyeglass case with gold lettering, "Dr. M. Bookstaber/Optometrist/490 Springfield Ave./Newark N.J.," was recovered from Burial 935A (Plate 8-54).

PLATE 8-53: Wire-Rimmed Eyeglasses

PLATE 8-54: Eyeglass Case With Gold Lettering

One of the more interesting objects was a possible railroad mail/baggage tag recovered from Burial 15,794B (Plate 8-55). This burial, based on other identified burials in the vicinity, dates to circa 1910. This piece was an octagonal-shaped, copper or brass tag with a hole at the top and the stamp, "P.T. & T.R.R./223/E.T." The first part stands for the Pennsylvania Tunnel and Terminal Railroad, which was a short line owned by the Pennsylvania Railroad that operated between the years 1910 and 1917. The entire length of track amounted to only 13,631 miles and extended from Kearny, New Jersey, under the Hudson River to a point opposite the town of Weehawken in New York. There it connected with one of the Long Island Railroad terminals. Although the company only began to report profits in November 1910, it is likely that service had been in operation since the early part of the year, or possibly the end of the previous year, since the track and terminals had first begun to be acquired in June of 1907 (Pennsylvania Railroad 2004). It is unclear what the function of the recovered tag was, but one use could be as a locker tag or as a "tool check" for the removal of a company tool by an employee of the railroad. This indicates that the deceased died suddenly, since this type of object would not generally be curated for any extended period of time.

PLATE 8-55: Baggage Tag

Other personal belongings of interest included two harmonicas from Burials 440A (Plate 8-56) and 15,162AB, respectively; 112 pen and/or pencil fragments; 250 safety pins; and 27 specimens and fragments of purses or wallets. An unusual smoking-related item was also recovered from Burial 11,459B. This piece was an ornately embossed, copper alloy match case with wooden matches (Plate 8-57). In addition, Burial 1,112A contained a rectangular stainless steel dish with fork and possible spoon fused together with a cloth remnants adhering to the dish. The dish appears to be a soap dish, with two holes and a scar from a mount, possibly utilized expediently as a food dish. The fork had a partially legible stamp, "_ _ 1877 N.F. & Co. _ S/A" (Plate 8-58).


PLATE 8-56: Bullet, Razor, and Harmonica


PLATE 8-57: Match Case


PLATE 8-58: Soap Dish and Fork

P. RELIGIOUS OBJECTS

Arguably the most significant group of artifacts recovered from burials at Potter's Field, from a symbolic standpoint, were religious objects. These 204 artifacts, in addition to providing evidence of religious beliefs, also provided valuable information on ethnicity, social standing, and even the possible occupation of the deceased. All of the recovered religious items represented a Christian denomination. The forms recovered included rosary beads, medals and crucifixes, unadorned crosses, and pendants. The rosary beads are attributable to Roman Catholic practice, with a form also used by the Eastern Orthodox Church. Prototype rosary beads were actually used historically by other Christian groups beginning in the tenth century, but they were a casualty of the Reformation when Protestant groups purged all iconography that was not rooted in Biblical teachings from their rituals (Panati 1987:39). They believed that this served to distance them from the Roman Catholic Church while establishing an identity created by a purist doctrine based on spirituality rather than earthly objects.

Although Protestants eschewed ostentatious ornamentation, they were not without tangible symbols of their faith. This was evident in the variation in crosses found at Potter's Field (Plates 8-59, 8-60, and 8-61). The Christian denomination associated with the interred was usually discernible from the form and ornamentation on the cross. A general rule of thumb is that crucifixes are crosses with a Christ figure, and crosses are plain and unadorned with no figure. The denominational association can be ascertained by the additional presence of a rosary or a religious pendant in Catholic burials. Of the 70 crosses/crucifixes recovered, 14 were associated with rosaries and at least an additional six probably came from rosaries. Still another 17 also had religious medals/pendants. This makes a total of 36 burials with crosses that were likely Roman Catholic. One definitive Greek Orthodox cross (Plate 8-62), distinguished by a double crossbar, was recovered from Burial 740A, and a second possible Greek Orthodox cross was recovered from Burial 11,582A. The former had a nearly complete inscription, "O Lord/Show Us Thy Face And We Shall Be Saved/Arch Confraternity Of The Holy Face/TOV___." This organization was established by Pope Leo XIII in 1885.

PLATE 8-59: Crucifix

PLATE 8-60: Cross

PLATE 8-61: Gold Crucifix

PLATE 8-62: Greek Orthodox Cross

The materials of the crosses included copper or copper alloy, plastic, wood, and composite materials, such as wood and metal. A common form (N=23) consisted of a copper alloy frame with a wood inlay. Another consistent form of religious object was large, round, wooden rosary beads. It is possible that rosaries were among the standard issue items that were provided to inmates by the institutions. Interestingly, of the six identifiable burials containing religious objects, five came from one of the Hudson County institutions.

The styles of rosaries were perhaps the most varied of all the religious objects. In addition to the wooden beads, glass beads of various colors, shapes, and sizes were also recovered. Light blue, faceted beads (Plates 8-63 and 8-64) were recovered from Burials 11,208A, 740A, 15,178B, and 658A/B. Oval milk glass beads (Plate 8-65) were recovered from Burials 11,184A, 11,615A and 11,097A. Other rosary types include black oval glass beads from Burials 658A/B and 119B, red faceted glass beads from Burial 693A, black faceted glass beads from Burial 11,632A, and black plastic beads from Burial 11,404A. At least five burials had more than one rosary.

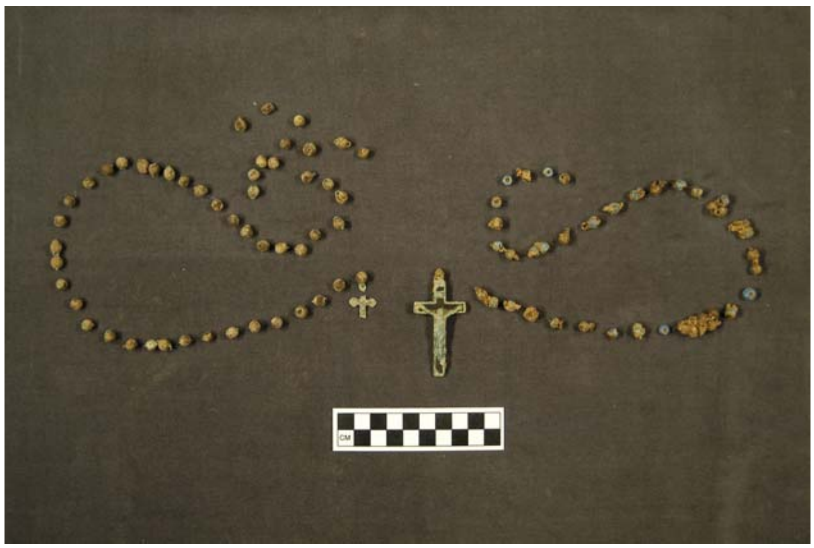


PLATE 8-63: Rosary with Light Blue Faceted Beads

PLATE 8-64: Rosary with Faceted Beads

PLATE 8-65: Rosary with Oval Milk Glass Beads

Religious medals or pendants, particularly those with legible inscriptions, provided the most personal information of all the religious artifacts (Plate 8-66). An example was a copper alloy medal from Burial 231A. This piece had the image of the Virgin Mary and the Christ child below the inscription, "Carmine Detta Della Bruna Napoli" on one side and the Christ figure on the cross under the partial inscription, "__rocifisso ____ntissimo" on the other side. This was a baptismal medal as indicated by the translation of the inscription, "For Carmine, Given by Bruna Napoli/ In Honor of Baptism." This suggests that other medals with the Virgin Mary and Christ Child motif may represent baptismal medals. These types were also recovered from Burials 490A, 1011B, and 15,058A/B. Another medal recovered from Burial 15,473A was an aluminum miraculous medal with the partial lettering, "PR_XCZYN SIE ZA NAMI____POM__." This lettering, typical of the Slavic languages, suggests that this individual may have been a recent immigrant from Eastern Europe. Numerous medals had Latin inscriptions, which was a practice that transcended ethnic boundaries throughout the Catholic Church until the 1962-1965 Second Vatican Council, which, among other things, ended the mandatory Latin Mass.

In addition, several medals with identical motifs and inscriptions were recovered. One of the better preserved examples was a silver medal from Burial 876B. This piece was determined to be a miraculous medal with the inscription, "O Mary Conceived Without Sin Pray For Us Who Have Recourse To Thee 1830." This same medal also was recovered from Burials 693A, 1130A/B, 11,344A, 11,489A, and 702B. This inscription refers to a message given to Saint Catherine Laboure during a visitation by the Virgin Mary in Paris in 1830. According to the message, those who wear the medal and repeat the prayer will receive "special protection from the Mother of God and abundant graces" (Chapel of Our Lady of the Miraculous Medal 2004). At least 15 other oval medals with worn inscriptions may be this type of medal. Another common design was the holy family medal, with various inscriptions surrounding the image of Mary, Joseph, and Jesus (Plate 8-67). One inscription from Burial 11,201A read, "Patrona et Protectrix Confraternitatis Nostra/ Sincta___/AD___Recurrius/Nos Osa___" around the holy family on one side and "Confraternitas Sanct Ae Familia Jesus Maria Joseph" around three hearts on the other side. Identical medals with a partial but similar inscription were recovered from Burials 863B, 11,208A, and 11,582A.

PLATE 8-66: Religious Medals and Pendants

PLATE 8-67: Religious Medal, Holy Family Medal, and Crucifix

One of the more unusual medals was recovered from Burial 15,228A. This piece was an aluminum oval with the partial inscription, "Madre Del Poverta_____VOL 1898" surrounding the letters "MA" and a crown motif on one side, and "Mater Pauperum Civi___tis Semmarie" surrounding an identified figure on the other side. This inscription, with its numerous translated references to poverty and pauperism, ironically was recovered from the burial of Raphael Stronindole, who died on August 6, 1913, in the Hudson County Almshouse. A well-preserved medal with the inscription "Our Lady of Sorrows O.P.N." on one side and "St. Gabriel Sorrowful Virgin/Pray For Us" on the other side was recovered from Burial 800A. St. Gabriel was an Italian saint who died from tuberculosis in 1862 at the age of 24.

Although the majority of the medals were made from common metals, such as brass, copper, or aluminum, several were made from precious medals. Burials 876B, 15,209B, and 211A contained religious medals made from silver. Two of the three were Blessed Virgin medals similar to ones made from brass or copper, with identical images and inscriptions. Burial 211A also contained other valuable objects, such as a silver dollar, four pennies, a nickel, a glass bead rosary, and a brass key, possibly to a door lock. Another religious object made from a precious metal was a solid gold pin with a raised crucifix recovered from Burial 740A/B. This pin may be related to Burial 740A, which contained a large amount of jewelry, including six sets of earrings and a sterling silver charm bracelet.

A copper alloy St. Benedict medal with an elaborate inscription was recovered from Burial 15,153B. This piece had a male figure with the words "Benedictine Crux S.P." on one side and a cross with the letters, "HIS V_S_M_Q_L_I_V_B" surrounded by the individual letters, "C,O,B,N,D,M,D,P,L,B" on the other side. Interestingly, St. Benedict is the patron saint of poison sufferers; he survived an attempt by monks to poison him in the sixth century. The series of letters stand for the words of a Latin prayer of exorcism against Satan. This medal was used as a prayer for strength against temptation.

Q. MILITARY MEDALS

Military medals (N=15) were among the most significant and informative artifacts recovered. In cases where service during a particular conflict could be determined, military medals could help narrow the identification of the interred by estimating the age of the individual at the time of military service and comparing it with the age of the remains. It could then be calculated to what year or range of years the burial dated. Most striking of these military-related objects was a collection of medals from Burial 15066B/C (Plates 8-68 and 8-69). These consisted of two "Grand Army of the Republic" medals, an army artillery medal, and a Battle of Monmouth centennial commemorative medal. The Grand Army of the Republic (GAR) was a Civil War veterans group organized in 1866, first as a fraternal organization and later as a political lobby. The GAR fought for veterans' pension rights and assisted aging veterans through the establishment of soldiers' homes and general relief efforts. At its height in 1890 the GAR could boast a membership of 409,489 and counted five U.S. presidents as members (Knight n.d.). One of the GAR medals had a scene on one side depicting two soldiers, a woman, a child, and an unidentified figure encircled by the inscription, "Grand Army of the Republic Veteran 1861-1866." The opposite side had a cluster of symbols consisting of a shield in the center surrounded by an array of crescent moons, maltese crosses, hearts, diamonds, and stars. A related medal with the embossment "DELEGATE" was recovered from the same burial. This medal had scroll edges with crossed swords along the bottom and the word "DELEGATE" on a raised bar over a five-pointed star and below an eagle facing right. The letters "GAR" are present on the left, middle, and right of the medal. This piece likely represents the status of the interred within the GAR. A yearly gathering known as the "Encampment" drew thousands of members from across the country. Representatives or "delegates" from each post tended to the affairs of the organization at this meeting, which included such diverse issues as pension legislation, memorial events, and the establishment of homes for elderly soldiers. One of the legacies of the GAR is the Memorial Day holiday, which was begun in 1868 as a day for recalling those soldiers who made the ultimate sacrifice.

A third military medal consisting of an eagle facing right atop crossed cannons over 10 cannonballs was also recovered. This motif indicates that the interred served in an Army artillery unit. A fourth medal unrelated to the Civil War was recovered from the same burial. This piece had a scene depicting Molly Pitcher loading a cannon below a sprig design above the words "Molly Pitcher at the Battle of Monmouth." The name "Whitehead and Hoag, Newark, N.J." was stamped on the back. This medal was distributed during the dedication ceremony for the Battle of Monmouth monument in Freehold, New Jersey, in 1881. It was given to individuals whose ancestors fought in the battle. Two copper alloy pin fragments, probably from a cloth medal or medals, were also present.

A total of nine military medals were recovered from Burial 64A (Plate 8-70). Based on the inscriptions, it appears that this individual was a veteran of the Spanish-American War. One of the medals was in the shape of a maltese cross, normally awarded for bravery in combat situations. A small metal ring hanging from the lower flange had the stamp "Veterans of Foreign Wars." A second medal had the bust of Admiral Dewey surrounded by the inscription, "Our Greatest Hero George Dewey" on one side, and an embossed image of the USS *Maine* on the opposite side.

PLATE 8-68: Army Artillery Medal, Battle of Monmouth Commemorative Medal, and "Delegate"

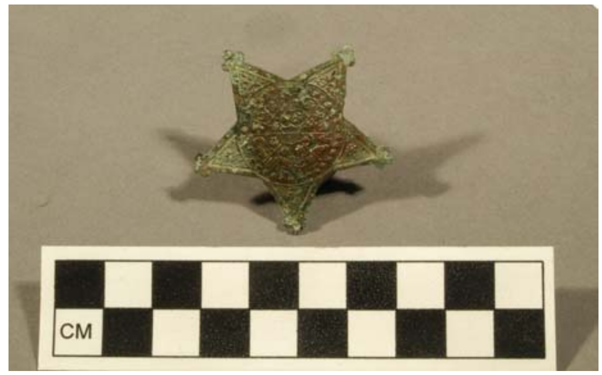


PLATE 8-69: Grand Army of the Republic Medal

PLATE 8-70: Military Medals

R. COINS AND TOKENS

Arguably the most important artifact category in regard to the dating of burials and, to a somewhat lesser degree, socio-economic status of the deceased were coins. A total of 323 coins/tokens were recovered from 111 burials. It should be noted that the actual number of burials with coins is likely much higher, since certain metal fragments or metal disks identified as possible buttons, may in fact have been coins that deteriorated beyond recognition in contexts that were not conducive to the preservation of "soft" metals, such as copper, silver, or certain alloys, used to mint coins. All of the standard coin denominations were represented, including pennies (N=93), nickels (N=65), dimes (N=68), quarters (N=38), half dollars (N=5), and one silver dollar (N=1). The range of coinage is quite impressive, particularly when one considers the context from which the assemblage originates. The earliest coin dates at least to 1818 and may be as early as 1810. This predates the earliest "poor farm" built around 1826. The latest identified coin is 1962, which coincidentally marks the final year of interments at Potter's Field. Denominations ranged from copper pennies to a $20 gold piece, mostly United States coinage but also including coins from England, Germany, and Ecuador. Proportionately, coins were more common in male burials than female burials. Although the ratio of male burials to female burials was higher overall (3:1), the ratio of coins by gender was significantly higher, just over 6:1. The actual number of coins within a particular burial varied from a low of one (N=42) to a high of 17 recovered from Burial 15,299B (Plate 8-71).

The dates on coins where identifiable were invaluable to dating burials with no or illegible name plates. On a larger scale, the date ranges of groups of coins from multiple burials provided approximate age ranges for sections of the burial ground, as well as the vertical distribution of burials thought to be temporally distinct from overlying burials. Although not infallible, a discernible pattern emerged among the dates of coins and the approximate year of death of the deceased (Table 8-4).

PLATE 8-71: V-Nickels, Barber Dimes, and Barber Quarters

TABLE 8-4

CORRELATION OF DATABLE COINS AND BURIALS

BERGER BURIAL NUMBER	BURIAL POSITION	BURIAL DATE (based on Match List)	COIN DATE	COMMENTS
149	AB	1930	No Date	Mercury Dime 1915-1945
401	B	1929	1894	Possible date – Nickel
427	AB	1930	193— or 195—	Partial Date- U.S. Penny 1930-1938
445	A	1924	1923	Buffalo Nickel
593	A	1931	No Date	Buffalo Nickel 1913-1938
11482	A	1902	1901	Indian Head Penny
15093	A	1916	1911	V-Nickel
15231	B	1913	1913	V-Nickel
15401	AB	1922	18—	Indian Head Penny 1859-1899
15437	B	1920	No Date	Buffalo Nickel 1913-1938
15463	A	1920	No Date	Buffalo Nickel 1913-1938
15479	A	1909	No Date	Lincoln Head Penny 1909-1958
15727	B	1913	1901	Barber Dime

Most of the coins were in quantities and types common among all classes during the late nineteenth and early twentieth centuries, but several specimens are notable for a variety of reasons. By far the most unusual in terms of monetary value was an 1879S "Double Eagle" $20 gold coin (Plate 8-72) recovered from Burial 11,633A. This piece was in mint condition and appears to have experienced little, if any, exchange prior to deposition. When first issued in 1879 the value of this coin represented a substantial amount of money, considering that the average weekly wage of the period was between $5.00 and $15.00 (Carter et al 1993:7).

The date range for this burial based on others nearby is circa 1905. Not typically found in circulation, this coin may represent an heirloom with intrinsic sentimental value in addition to its obvious monetary worth. Foreign coins (N=7) formed a small percentage (2.5 percent) of the overall coin assemblage. A 1918 Ecuadoran coin with the embossment "Republica Del Ecuador/Diez Centavos" was recovered from Burial 284A (Plate 8-73). One U.S. Buffalo nickel (1913-1938) with an illegible date also was recovered with the Ecuadoran coin. This burial likely dates to circa 1929. A number of British coins (N=3) were recovered from Burial 11,459B (Plate 8-74). One was dated 1883 and had the partial embossment "______Britt Reg. F.D." on one side and illegible lettering on the opposite side. The complete inscription would have read "Victoria DG Britt Reg FD" with the mark "One Third Farthing" on the opposite side. These coins were minted from 1844 until 1901. A second British coin was recovered with an image of Queen Victoria and the partial inscription "Dei Gratis Reg____" on one side and "One Penny" on the other. This coin had no date, but based on the image present dates to between 1844 and 1901. A third, badly worn coin was also recovered from this burial. The only discernible mark was a standing lion on a stippled background. Although there was no visible inscription, the lion motif indicates that this was also a British coin. A fourth copper disk worn smooth was similar in size and form to the one cent piece, indicating that it too, was a British coin. No U.S. currency was found with this burial, possibly suggesting that this individual died shortly after arriving in this country.

PLATE 8-72: 1879S "Double Eagle" Twenty Dollar Gold Coin

PLATE 8-73: Ecuadoran Coins

PLATE 8-74: British Coins

A group of German coins (N=3) were among six coins recovered from Burial 15,796 (Plate 8-75). All three were in good condition and had the inscription, "Deutsches Reich Pfenning/10." Two had the dates 1906 and 1907, respectively, and the third date was illegible. Three U.S. coins were also found in this burial: an 1882 Indian Head penny, a 1908 Indian Head penny, and a 1906 V-nickel. Although this individual was not identified, dated interments in the vicinity of this burial indicate a date between 1909 and 1910. It also likely suggests that this individual died shortly after arriving in this country.

PLATE 8-75: German and U.S. Coins

The majority of the coins recovered from Potter's Field represent amounts typical of "pocket change," rather than a true measure of a person's total wealth. However, the position of at least one coin clearly showed a ritualistic intent. An 1898 Indian Head penny inside a leather pouch was recovered from the eye socket of Burial 11,511A (Plate 8-76). This practice is known from burials in eighteenth-century England, although it is most often associated with African-American burials (Kenny et al 2003: 79-80). Evidence of this practice has been found at the African Burial Ground in New York City, along with numerous African-American burial grounds in the South and Midwest. The purpose behind this practice varied, from keeping the eyes shut, to keeping out ghosts, to, particularly in the case of African-American burials, providing a fee for the return of the spirit to the ancestral homeland (Cotter et al 1993:286; Kenny et al 2003:80; Rose 1985:61).

In terms of monetary value, the coin totals ranged (excluding the $20 gold coin) from a low of one cent, i.e. Burial 38B, Burial 186A, to a high of $2.75 from Burial 15,299B. The average amount in those burials with identifiable coins, excluding the $20 gold piece, was slightly over 12 cents. Interestingly, of the 19 burials identified by name that contained coins, only three came from one of the Hudson County institutions. Of these three, one had only been hospitalized for approximately three days. This suggests that patients/inmates of the institutions, particularly those held for long periods of time, had no currency or disposed of any coins on hand during their stay at the institutions.

A number of tokens representing a variety of activities were recovered from Potter's Field. Five identical copper tokens were recovered from Burial 15,096A. All have an impressed rope decoration around the edge and the stamp, "H.K. Co./50" in the center (Plate 8-77). These may be "mining" tokens, which were given to miners as part of their wages and could then be exchanged for goods in the company store. Pennsylvania coal mines were representative of this practice. This burial, based on its location to other identified burials, dates to somewhere between August and October 1916. A brass token found in Burial 284A had the letter "M" cut through the center and the inscription "Morrell's Cafeteria" on one side and "Good For 5(cents) In Trade" on the other side (see Plate 8-73). This piece was likely for use in an "automat" style of cafeteria, which were popular during the first half of the twentieth century. This burial, based on its location near other identified burials, dates to somewhere between May and July 1929. A somewhat puzzling copper alloy token was recovered from Burial 208B. This piece had a motif consisting of an Indian head facing left with the word "Pontiac" on top and the partially legible date "185_" at the bottom. A worn, indeterminate design was present on the opposite side. This token may represent a commemorative token, although the date apparently has nothing to do with Chief Pontiac, who lived between 1720 and 1769 and became known for his battles with the British between 1763 and 1764 in what became known as "Pontiac's War" (Henretta et al 1993). An interesting token that may provide some indication of the range of recreational activities engaged in by some of the interred is a souvenir brass token recovered from Burial 401B. This piece had the inscription, "Rudolph Valentino/The Eagle" surrounding a male figure on one side, and "The World Premiere Strand Theatre Nov. 6, 1925" on the opposite side. The particular spelling of "theatre" on the token indicates that this was from the premiere at the Strand Theatre in London, England. This burial has been identified as John Bussian, who died on May 15, 1929. The three-and-a-half-year time lapse between the date on the token and the date of death suggests that this piece was an important keepsake of the interred.

PLATE 8-76: Indian Head Penny in Leather Pouch

PLATE 8-77: Copper Tokens

S. PAPER OBJECTS

A number of the burials contained some type of paper item, either in the form of newspapers, magazines, or maps or various books/booklets. By far the most common paper items were newspapers. The majority of newspapers where identifiable were New York-based. When the name, text, and/or date were legible, newspapers were valuable indicators of the time of burial, since it is unlikely that they were conserved for extended periods of time before discarding. One notable example was Burial 656B (Plate 8-78). This burial contained two New York newspapers, the *Daily Mirror* from Wednesday, May 9, 1934, and the *Journal*, dated Thursday May 10, 1934. The body appeared to have been wrapped in newspaper, with some simply rolled up next to the body.

In addition to dating a burial, newspapers are also tangible reminders of the historical context in which the interred lived. A possible magazine or Sunday newspaper from Burial 970B dated 1935 makes several mentions of Adolph Hitler. Burial 828B contained three newspapers from August and September 1936, just days after the 1936 Olympics in Berlin. Interestingly, one of the articles recounts an aide to Hitler explaining that Jesse Owens was not purposely snubbed by Hitler after the Olympics, it was simply a matter of the German dictator's busy schedule.

Another interesting paper artifact was a fragmented map recovered from Burial 1,112A. Features and city names indicate that this was a Russian map, possibly of the region encompassing St. Petersburg (Plate 8-79). This burial contained numerous other artifacts, including four U.S. coins, the latest of which was 1944. Although the identity of this individual was not determined, other burials in the general vicinity place the date of this burial to the late 1940s. Unfortunately, the remains of this individual were in poor condition, and therefore the only identification was that the interred was an adult male. It is possible, however, that this individual was a recent Russian immigrant, perhaps part of the exodus resulting from the post-World War II restructuring of Europe.

A booklet recovered from Burial 331B (Plate 8-80) indicates that the deceased likely worked as a conductor for the Delaware Lackawanna Railroad. The partially legible lettering read, "___Delaware Lackawanna/___Railroad Company/___Card Way-Bill/Empty Car/Initial Number/___nd of car?_____specific order indicate order/____home empty by me___/initials SHE____." This form was used by conductors when a car was taken out of service during the scheduled operation of a train.

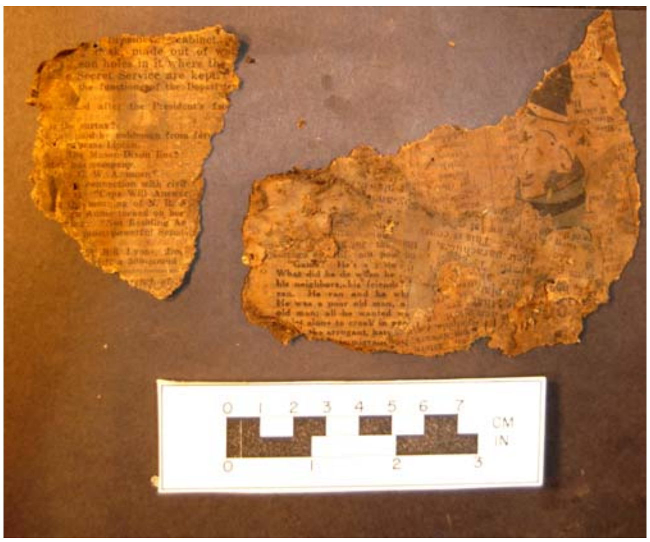


PLATE 8-78: New York Newspaper Fragments

PLATE 8-79: Fragments of Russian Map

PLATE 8-80: Railroad Conductor Booklet

T. TOBACCO PIPES

Smoking pipes and smoking-related objects were common items in many of the burials. A total of 194 pipe or pipe fragments were recovered from Potter's Field. Although the majority of pipe fragments were clay, other materials, such as wood, rubber, and plastic, were represented in the assemblage. This is emblematic of the decline in popularity of pipes made from clay in favor of the more durable wood or rubber types. Plastic/or celluloid mouthpieces also offered the smoker a smoother, more form-fitted grip. The new materials provided smokers with a more durable product, and the detachable mouthpieces could be removed for cleaning or replacement. Late nineteenth-century catalogs advertised replacement mouthpieces made of amber, which was an antecedent material to celluloid/plastic and hard rubber. Also, by the late nineteenth century wooden pipes had become ornately carved with optional decorative hardware, such as incised metal covers and stem sleeves (Zorn 1892). Interestingly, all of the recovered non-clay pipes were plain, with the only differences being either a straight or bent stem (Plate 8-81). In addition, three corncob pipes were recovered from Burials 589B, 11,275A, and 1012A/B, respectively.

A total of 148 clay pipe fragments were recovered from Potter's Field. The fragments were divided between stem (N= 77) and bowl (N=46) fragments. In addition, a number of intact or nearly complete pieces consisting of a bowl and stem were recovered (N=33). Most were plain, undecorated specimens, with several notable exceptions. A complete pipe composed of a clay bowl and stem with a hard rubber mouthpiece was recovered from Burial 11,166B (Plate 8-82). The bowl had an ornate patriotic design in impressed relief consisting of a star and ray over an eagle over crossed flags with an elongated sprig design along the front and back mold seams. A significant amount of burnt tobacco was present, indicating its use shortly before interment. Pipes with patriotic themes were widely advertised in catalogs during the late nineteenth century, reflecting the increased sense of nationalism that characterized the mood of the country in the post-Centennial period.

PLATE 8-81: Smoker's Pipe

PLATE 8-82: Clay Pipe With Hard Rubber Mouthpiece

A second decorated bowl was recovered from Burial 11,012A. This piece had fluted lines with a stem set at a 45-degree angle (Plate 8-83). These style bowls were advertised under the name "Powhattan" bowls and may have had a straight or bent reed stem. They were popular during the years 1850 to 1900 (Noël Hume 1970; Zorn 1892:20-21). A terra-cotta bowl recovered from Burial 123A (Plate 8-84) was similar to types advertised in the *1892 George Zorn and Co. Pipes and Smoker's Articles Catalog*. This piece consisted of a plain bowl set at a 45-degree angle from the stem and had a bore diameter of 5/64". This style is depicted in the *1875 William Demuth & Company Catalogue* (Sudbury and Pfeiffer 1983:72). A second redware bowl with a brown interior slip was recovered from Burial 318A. Both of these forms were typical of ceramic pipes from the late nineteenth century. Interestingly, all of the identified mouthpieces had bulbous ends, which was also a common design of pipe stems from the late nineteenth century. The absence of ornamentation beyond a maker's mark on any of the recovered fragments may be a reflection of the socio-economic status and access to goods of the interred population. Decorated bowls were extremely popular throughout the nineteenth century, albeit at a higher cost than undecorated pipes (Noël Hume 1970:304; Zorn 1892). Pipes with figurine motifs depicting human or animal heads were widely advertised in catalogs from the mid- to late nineteenth century (Rapaport 1979:22, 24-25).

PLATE 8-83: Chandelier Teardrop Crystal, Hard Rubber Pipe Bowl, and Fluted Pipe Bowl

PLATE 8-84: Terracotta Pipe Bowl

The most diagnostic attribute found on a number of the specimens from the Potter's Field was the makers' marks. One in particular, the mark of Mullenbach and Thewald, Germany, was present on fragments representing at least 48 individual pipes from 17 different burials. The Mullenbach and Thewald Company manufactured clay pipes in Hohr, in the Westerwald section of Germany, from 1830 until 1930. Mullenbach and Thewald pipes are distinguished by a variety of marks, including "M&T," "M&TH," "Germany," and "Mullenbach & Thewald Germany." Occasionally, the model number will appear with the maker's mark. Pipes manufactured by Mullenbach and Thewald have been found in New Jersey, New Mexico, and South Carolina and are fairly common on sites in the New York metropolitan area, with at least one specimen recovered from the Five Points Site in lower Manhattan (Diane Dallal, personal communication 2004; Walker 1977:275). Remarkably, Burial 11,587A at Potter's Field contained 57 clay pipe fragments representing at least 27 distinct pipes (Plate 8-85). All of these pipes were manufactured by Mullenbach and Thewald and none appeared to have any evidence of use. Only one mendable, complete pipe was identified. The number of pipes present was based on the number of mouthpieces recovered. The pipe fragments were distributed throughout the burial, indicating placement over the body, rather than in a pocket. This might suggest some type of expedient ritual before burial and, most likely, before the coffin was sealed.

PLATE 8-85: Mullenbach and Thewald Clay Pipe Fragments

A number of pipes with the stamp "TD" also were recovered from Potter's Field (Plates 8-86, 8-87, and 8-88). TD pipes were found in Burials 1,142A, 11,605B, 11,637B, 15,187B, and 833A. The latter burial may have contained multiple specimens. "TD" pipes are perhaps the most common mark found on clay pipes from archaeological sites in North America, having been recovered from sites ranging from New York to California, New Hampshire, Ohio, and everywhere in between. Although TD pipes have been manufactured since the early eighteenth century by any one of a number of pipe-makers with corresponding initials, they continued to be "knocked off" into the twentieth century by dozens of pipe-makers with no affiliation to the original producers. Although the TD mark is found in various forms and placement, the type recovered from Potter's Field, with the letters facing the smoker, is typical of the period 1850 to 1900 (Alexander 1983:200-204; Zorn 1892:8).

PLATE 8-86: Clay Pipe Bowl With "TD" Stamp

PLATE 8-87: Clay Pipe Bowl With "TD" Stamp

PLATE 8-88: Clay Pipe Bowl and Stem With "TD" Stamp

A pipe stem fragment with the partial stamp "Glasgow" was recovered from Burial 15,226B (Plate 8-89). A partial stamp on the opposing side of the stem appeared to be an "M." This mark, if complete, may have read "McDougal Glasgow." This company was founded in 1846 and operated until at least 1910, and possibly later. This fits well with the time frame of 1913 for the burials in the vicinity of Burial 15,226B. It should be noted that the firm of McDougal and Company were large manufacturers of TD pipes (Sudbury 1980:30-35). This suggests that some of the bowl fragments from other burials may have been manufactured by the McDougal firm.

PLATE 8-89: Clay Pipe Stem with "Glasgow" Stamp

One of the more puzzling artifacts recovered from Potter's Field is a clay "belly bowl" pipe from Burial 49B. The bore diameter was 6/64" and the bowl was set at a 145-degree angle relative to the stem. Rouletting was present around the rim. The initials "WB" were present in relief on either side of the heel. This style of pipe is dated to circa 1700. The shape and angle of the bowl are often reliable indicators of the time in which they were manufactured. The earliest pipe bowls tended to be smaller and ovoid and set at an obtuse angle relative to the stem. Over time the bowls became larger and more cylindrical and were gradually set at more of a right angle relative to the stem. Also, the practice of stamping the pipes with the maker's initials dates back to the late seventeenth century in England (Atkinson 1965:249). Oswald lists a total of at least 54 different pipe-makers with the initials "WB" operating in England between 1635 and 1850 (1967:28-29). However, the date range for the style of the pipe recovered from Potter's Field narrows the field to about five. According to Atkinson, pipes with the initials "WB" are the most common for the period 1700 to 1720 (1965:254).

Eighteenth-century pipes in the New York metropolitan area were predominantly of English origin. Eighteenth-century London-style pipes had upright, heeled bowls, a style classified as Type 25 in Atkinson and Oswald (1969). A majority of marked London-style bowls exhibit the maker's initials (sometimes crowned), or some other motif, on either side of the heel, in a style characteristic of London pipe-makers (Atkinson and Oswald 1969). Heelless bowls were commonly produced in Bristol from circa 1680 to 1750. When makers' marks are present on these heelless pipes, the majority of the marks consist of a cartouche on the right side of the bowl and/or initials stamped on the back, facing the smoker (Jackson and Price 1974).

The explanation for the presence of a pipe bowl dated to the early eighteenth century in a burial dated to the early twentieth century may be rooted in the early land use of Potter's Field. It is highly unlikely that the pipe belonged to the interred or was purposely placed with the remains prior to burial. Noël Hume states that almost since their inception the relatively inexpensive clay pipes were usually manufactured, used, and discarded all within one to two years (Noel Hume 1970). Thus, this piece almost certainly was not an heirloom that was kept for over 200 years. Rather, it may have been lost or discarded by one of the early occupants of the burial ground property and intermixed with the backfill after the graves were dug, eventually ending up within the matrix of the human remains.

U. TOYS

A number of toys and toy parts (N=14) were recovered from the burials at Potter's Field. These include a fragment of a porcelain doll known as a "Frozen Charlotte." These dolls were first introduced around the mid-nineteenth century, becoming extremely popular around 1870. They were manufactured in Germany (where most dolls of the late nineteenth and early twentieth centuries were produced) up to about 1930. These dolls were originally intended for use as dollhouse figures or as a child's bath toy since they could float in water. During the late nineteenth century, however, they were used in teacups to draw the heat from the boiling water, thus preventing the cup from cracking. The cheap price (39 cents per dozen in 1888) made them expendable and easily replaced if broken (Lavitt 1983:169, 225). Several fragments of a "bisque" doll (or dolls) were recovered. Bisque, an unglazed porcelain with a soft, matte finish, was a popular material for dolls from circa 1860 until 1930, with the greatest popularity reached during the 1870s. These dolls were produced in France and Germany, and were characterized by bisque heads and limbs sewn on to cloth bodies (Lavitt 1983:12-13).

Other toys recovered from Potter's Field included a large rubber doll and several marbles. The doll was constructed of a rubber body and head with nylon hair (Plate 8-90). Surprisingly, this doll was recovered from the burial of an adult female. This suggests that it may have been the possession of an adult with a mental disorder. A total of 11 marbles and one leather marble bag were recovered from Potter's Field. Three of these were identified as "Bennington" types (Plates 8-91 and 8-92). Bennington marbles are glazed ceramic types made in Germany. These types disappeared several years before the outbreak of World War I. The *1903 Sears Roebuck* and *Our Traveler* catalogs advertised glazed ceramic marbles, with none offered in subsequent years (Randall and Webb 1988:15-16). A total of three handmade glass marbles were recovered, two in Burial 11,517A (Plate 8-93) and one in Burial 4X. Handmade glass marbles were first produced in Germany in 1846 and imported into the United States shortly thereafter. By 1925 handmade glass marbles had been replaced by machine-made glass marbles made exclusively in the United States (Randall and Webb 1988:21-22). In addition, five clay marbles were recovered from Burial 283B, identified only as an "Unknown Man" from Hoboken. Clay marbles were among the most common of the earthenware types, largely because of the availability of clay and the simplicity of the production process. It was not unusual for children to make their own marbles from local clay fired in a household oven or open fire. Homemade marbles are easily distinguished from factory-produced by their somewhat asymmetrical shape. The five specimens recovered from Burial 283B were clearly homemade (Randall and Webb 1988:15).

PLATE 8-90: Large Rubber Doll

PLATE 8-91: Glazed Ceramic Marble

PLATE 8-92: Glazed Ceramic Marble

PLATE 8-93: Handmade Glass Marbles

V. AMMUNITION

It is interesting to note that a number of ammunition-related artifacts were recovered from several burials at Potter's Field. Of these artifacts, five were 12-gauge shotgun shells and five were various-sized smaller caliber bullets, four of which were likely fired from handguns. The shotgun shells may be an indication of the limited development in the outer regions of Hudson County during the late nineteenth and early twentieth centuries that allowed for the discharge of firearms near the burial ground. Some of the bullets, however, were clearly associated with the interred. A .38 caliber bullet from Burial 11,513B (Plate 8-94), a .32 caliber bullet from Burial 15,239A (Plate 8-95), and a bullet of indeterminate caliber from Burial 11,035A were all impacted. The bullet from Burial 15,239A clearly contributed to the cause of death and is discussed in greater detail in Chapter 9. An intact 30.06 bullet recovered from Burial 440A appeared to have been in the breast pocket of the deceased, along with a harmonica and razor (see Plate 8-56).

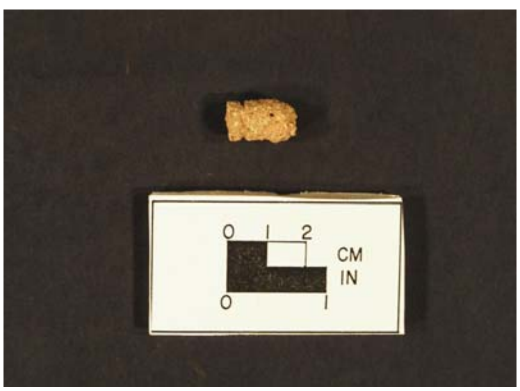


PLATE 8-94: .38 Caliber Bullet

PLATE 8-95: .32 Caliber Bullet

W. PERSONAL HYGIENE

Among the more surprising artifacts encountered at Potter's Field were objects related to personal hygiene, including brushes, shaving articles, and combs (Plate 8-96). The brushes consisted of toothbrushes (N=5), shaving brushes (N=3), an unidentified brush fragment (N=1), and a toothbrush case (N=1). Two of the toothbrushes recovered from Burials 427A/B and 793A (Plate 8-97), respectively, had the stamp, "Dr. West's/Pat'd Jan. 2, 1925.L440, 785/Made in USA." This may be an example of a standard issue item from one of the institutions. Also, the patent date indicates that plastic toothbrushes with nylon bristles were being manufactured by 1925. This is a departure from the early twentieth century, when toothbrushes made of bone with animal hair bristles were still widely advertised (Sears Catalogue 1902). By 1927 the Sears Catalogue was advertising toothbrushes with "celluloid" (an early form of plastic) handles exclusively. Two shaving brushes recovered from Burials 276B and 477A, respectively, are also suggestive of a standard issue item. These brushes had the mark, "Ever Ready/Made in USA/ Sterilized/Set In Rubber," stamped on the handle.

This brand was advertised in the 1927 Sears Catalogue (1927:498). The shaving articles consisted of razors/razor fragments (N=17) and a shaving kit from Burial 401B (N=1) (Plate 8-98). Several of the razors, which included both straight and disposable razors, were ornately decorated with carved ivory, celluloid, or gold-plated handles. These non-functional attributes are suggestive of personal ownership rather than the more austere design of institutional supplies, or the minimally decorated objects used out of necessity.

PLATE 8-96: Common Toiletries

PLATE 8-97: Women's Toiletries

PLATE 8-98: Men's Toiletries

Other items related to personal hygiene included combs (N=74), which can be further subdivided into pocket combs (N=44), decorative combs (N=26), and beard/lice combs (N=4). The pocket combs were predominantly black hard rubber or plastic models, some with stamps such as "Unbreakable," "Gem," "Okay Made in the USA," or "I.R. Comb Company." One unique example was manufactured with the stamp "Bolta," and then personalized with the handpainted phrase "Save Us Lord of Life." Phrases such as this are indicative of Catholic doctrine, with a strong belief in purgatory, where souls need to be saved in order to enter heaven. Protestants, on the other hand, do not subscribe to the concept of purgatory (Mytum, in press). All of the beard/lice combs were fine-toothed, double-sided types. The Sears Catalogue of 1897 depicts these combs as being mounted on a handle (Sears Catalogue 1897). It is unclear if any of these represent standard issue materials from the institutions or if they are simply homogeneous products utilized by the general public. The women's decorative combs, however, indicated a wider range of individual style and personal preference. Most had some type of decoration, usually a scalloped edge. Others had more elaborate ornamentation, such as faux diamond inlays or copper alloy mountings. All were made of plastic or celluloid except for one from Burial 15,386B, which was made of tortoise shell (Plate 8-99). Three ladies' French twist plastic hair combs were recovered from Burial 15,764A (Plate 8-100).

PLATE 8-99: Tortoise Shell Hair Comb

PLATE 8-100: Frenchtwist Hair Combs

X. PROSTHETICS

Prosthetics and medical-related items were fairly common among burials within Potter's Field. Dentures and artificial bridgework (N=101) predominated this group. The majority of these were made of a vulcanite rubber palate with porcelain teeth (Plate 8-101). Dentures made of vulcanite rubber were first developed in 1864 when the Goodyear Company obtained its first patent. The hardened rubber palate was a vast improvement over going without but still resulted in dentures that were often times ill-fitting and uncomfortable. Vulcanite dentures were extremely popular among all socio-economic classes until the 1940s, when they were replaced by dentures made from pink plastic (Creighton University Medical Center 2004). Interestingly, a significant number of dentures had gold components (N=19), either in the form of teeth or a palate (Plate 8-102). This is significant in the context of Potter's Field, where the expectation of recovering items of any value was originally considered to be low. Although gold has been used for the manufacture of dentures for the wealthy since the eighteenth century (Paul Revere was known to fashion custom-fitted dentures from such precious metals as silver and gold), the procedure for making gold dental inlays was first patented by Dr. William Taggart in 1907 (Creighton University Medical Center 2004). Surprisingly, dentures made from gold were often more comfortable to the wearer than vulcanite, since the former could be more accurately molded to the individual palate and would retain its shape over time. Winston Churchill's original dentures were made of vulcanite rubber, but changed to a gold palate with porcelain teeth for greater comfort and durability (Royal College of Surgeons of England 2004).

PLATE 8-101: Rubber and Porcelain Dentures

PLATE 8-102: Gold and Porcelain Denture

Other prosthetic objects recovered included a ferrous leg brace recovered from Burial 15,621A (Plate 8-103), a plastic hernia truss with metal fittings stamped "F.B. Seeley & Co. Warranted" found in the pelvic region of Burial 11,220A (Plate 8-104), and glass eyes (N=2). The ferrous leg brace had a canvas or elastic strap used to secure the piece to the calf of the leg. The glass eyes (Plate 8-105) were recovered from Burial 648A and Burial 11,288B. The latter consisted of four fragments that mended to one complete glass eye. The two specimens were "right eyes" identical in both form and coloration. Interestingly, neither one was a true eye "ball." Rather, each was a convex oval, with a brownish iris and thin red lines to add realism to the scelera (whites of the eyes). Glass eyes date at least as far back as the time of Shakespeare; however, German craftsmen are credited with developing the types (from around 1835) recovered from Potter's Field. Glass eyes could be fitted to a particular patient or chosen from hundreds of stock eyes that eye doctors kept in their offices. With the onset of World War II glass eyes from Europe became extremely difficult to obtain. As a result, plastic eyes supplanted glass eyes as the preferred ocular prosthetic (Hughes 2004).


PLATE 8-103: Leg Brace


PLATE 8-104: Hernia Truss

PLATE 8-105: Glass Right Eye

Y. GLASS

A total of 1,450 glass artifacts were recovered during the excavations of the Potter's Field burial ground. Many of these were intact or nearly complete. The temporally diagnostic vessels from Potter's Field with bracketed manufacturing ranges date as early as 1840 with end dates as late as 1915. These dates are based on bottles that exhibit characteristics of machine-manufacture and snap case technology, respectively. Based on the preponderance of vessel *termini post quem* (TPQs) (the time after which) of 1870 or later, the glass assemblage appears to date to the last quarter of the nineteenth century through the early decades of the twentieth century.

Unlike the ceramic assemblage, it is likely that many of the glass vessels were intentionally included with the remains prior to burial. This may have been the result of expedient ritual, disposal, or personal effects considerations by institutional or cemetery staff toward the deceased. One burial in particular, Burial 793A, had an inordinate amount of complete bottles, consisting mainly of perfume/make-up/cold cream vessels (Plate 8-106). This burial and its associated glass assemblage are discussed further in Chapter 11.

Vessel form and function was identified in some instances; however, the majority of the glass was too fragmentary to categorize beyond color and part (body, base, etc.). Of the identifiable bottles recovered from Potter's Field, the majority were beverage bottles (N=22). These consisted of wine or liquor bottles (N=18), patent-style soda or mineral water bottles (N=3), and a milk bottle (N=1). Seven bottles in the beverage assemblage bear partial embossments. One exhibits the partial embossment of a local Newark bottler. The remaining embossments mainly identify the contents, such as "Wine" or "Whiskey," or the capacity, such as "Half Pint" or "Contents Fluid Ozs." A single bottle is additionally embossed "This Bottle Not To Be Sold," evidence of the returnable bottle system in place in the metropolitan area during the latter part of the nineteenth century and early twentieth century. Under the returnable system, bottles were considered the legal property of the bottler, and consumers were supposedly obligated to return them to the bottler for refilling. Although returning bottles was practical when distribution was localized, as was generally the case with soda and beer (Busch 1987:70), often the bottles were simply discarded.

Although the majority of the beverage bottles could be associated with surface refuse prior to burial, it is possible that at least some of the vessels were intentionally buried with the interred. These would most likely be limited to alcohol, pharmaceutical, and perfume bottles. Conversely, vessels included within the categories of tablewares and household items would follow a disposal pattern similar to the ceramic assemblage and thus be intrusive. A number of the bottles were clearly below the skeletal remains, indicating either intentional inclusion in the burial or intermixing of refuse fill.

The second largest category of glass bottles with identifiable function were embalming bottles (N=18) (Plate 8-107). Unlike the other bottle types, these bottles were almost entirely complete and often were found with their closures present. Several had their contents intact, although most were empty or contained only groundwater that had seeped into the vessel. It is likely that these bottles contained a formaldehyde solution. Prior to around 1900 the most common materials used in the embalming process were arsenic, heavy metal salts, and alcohol (Champion 2003). The use of arsenic as an embalming agent dates to the Civil War. Although effective, arsenic does not break down once introduced into the soil and can be toxic to handlers for generations. In response to the growing concerns for the safety of embalmers and doctors performing autopsies, a ban was placed on using arsenic in the early 1900s (Konefes and McGee 2003). Interestingly, all of the embalming bottles were recovered from burials dating to between 1923 and 1933, well after the introduction of formaldehyde in embalming. It appears that these bottles were intentionally placed in the coffin, perhaps as a convenient means of disposing of empty bottles after use.

PLATE 8-106: Cosmetic and Medicinal Bottles


PLATE 8-107: Embalming Fluid Bottles

Several of the bottles had embossed makers' marks, and others had numerical measurement scales vertically oriented along the corner of the bottle. The most common mark was "Gray's Chemical Company/Manufacturing Chemists/Newark N.J./Embalming Fluid Specialists" (N=3) (Plate 8-108). Gray's Chemical Company was in operation from 1910 until 1929. Other marks included Champion Chemical Company, Keller Chemical Company/Phila/USA, Undertaker's Supply Company/Chicago/Ill, and West Disinfecting Company, New York. The Champion Chemical Company is one of the oldest manufacturers of embalming supplies, having been established in 1878 to meet the demands of practitioners who were operating across the United States (Bedino 2001; Konefes and McGee 2003). The diversity of manufacturers suggests a preference by the embalmers for particular solutions containing different formulas, perhaps varying concentrations of formaldehyde. Four bottles containing disinfectants that were part of the embalming process were recovered. These solutions were prepackaged formaldehyde dilutions that were first introduced in the 1920s (Bedino 2001). Two of these bottles, both from Burial 335B, had paper labels that read "Methalium/Preservative/Deodorizer/Disenfectant."

A number of pharmaceuticals were among the identified glass vessels (N=25). These consisted of general pharmaceutical bottles/vials (N=9), perfume bottles (N=6), patent/proprietary medicine bottles (N=5), drugstore bottles (N=3), iodine (N=2) and a tonic bottle (N=1). Seven of these bottles exhibited embossments. The medicines include Bromo-Seltzer, Sloan's Liniment, and Omega Oil. Drugstore bottles in the collection consist of specimens from the M.W. Sargeant Pharmacy (Plate 8-109), established in 1896 on Wayne Street in Jersey City (N=1), and the Laird's Pharmacy, also established in 1896 and located at the corner of Washington and Jersey avenues in Jersey City (N=1). The single tonic bottle has a partial label that read "___ Tonic/A Healthful Astringent to be used in water, it closes the pores, cleans the skin and reduces puffiness under the eyes/Elizabeth Arden/673 Fifth Avenue." The embossment "Arden" is present on the base. Elizabeth Arden first began marketing her products around 1910. By 1920 she had over 600 products on the market targeting women eager to shed the restrictions on personal adornment in the post-Victorian period. While products such as the tonic recovered from Burial 427 A/B were largely cosmetic, there was a medicinal quality that stemmed mainly from Ms. Arden'' nursing background (Elizabeth Arden 2004). A number of the perfume bottles, although without lettered embossment, were among the most elaborately designed vessels recovered. An ovoid-bodied perfume bottle recovered from Burial 230A/B was decorated with a Greek key motif around the base and a glass/cork stopper (Plate 8-110). In addition, a small, square-bodied perfume vial with a cork stopper was recovered from Burial 250B, and an ovoid-bodied perfume/make-up vial with a pinkish liquid was recovered from Burial 427A/B.

PLATE 8-108: Gray's Chemical Company Embossed Bottle

PLATE 8-109: Pharmaceutical Bottles

PLATE 8-110: Perfume Bottle

Medicines designed to alleviate the rather common ailments of stomach upset and constipation were also recovered from Potter's Field. A cobalt-blue Bromo-Seltzer bottle was recovered from Burial 11,490A. Bromo-Seltzer was, and continues to be, a common remedy for sour stomach, heartburn, and acid indigestion associated with minor pain. A cobalt-blue bottle with the embossment "2/Wyeth/Patented" was recovered from Burial 427A/B. John Wyeth & Brother developed a unique glass package for their constipation cure, which was popular around 1900. The bottle incorporated a dose cup as the cap to the bottle, with directions for it to be used to measure an adult dose of the medicine ("This Cup Holds A-Heaping-Dessert-Spoonful"). The cup also could be used as a time lock, changeable to the hour at which the next dose was scheduled to be taken (Fike 1987:187). The Sloan's Liniment bottle was recovered from Burial 769A/B (Plate 8-111). Sloan's Liniment was first advertised in 1852 in Boston. Based on the bottle'' production method, embossment, and lack of an Owen's symbol (O superimposed over a diamond), this bottle was manufactured after 1903 but prior to 1929 (Fike 1987:137).

The next largest category of bottles and associated items in the Potter's Field glass assemblage was assigned a culinary, or food-related, function (N=8). This category consists exclusively of general condiment bottles (N=6) and glass liners (N=2). Two of these items exhibit identifiable markings. One piece, a clear glass condiment bottle, has a partial label that read "____MIXT[URE]/NEW Y[ORK]" and the embossment "Pat. 105231/Ball" on the base. The embossment indicates that the jar may have been manufactured by the Ball Bros. Glass Manufacturing Co. (also known as Ball Bros. Co. or Ball Corp.) sometime after 1888. One of the glass preserve jar liners, intended for placement inside the metal jar lid to prevent food from being contaminated through contact with the metal lid, is embossed with the name "Atlas." This may be a product of the Hazel-Atlas Glass Co., which manufactured lid inserts between 1920 and 1964.

A number of milk glass cold cream jars (N=4) were recovered from Potter's Field. Two also had ferrous caps and a small amount of cold cream still present. One of these, found in Burial 793A (see Plate 8-106), had an elaborate scroll embossment on the side. The other was an oval jar with a Greek key design on the side and the embossment "Woodbury/9/53/E" on the base. A third specimen recovered from Burial 11,465A had the embossment "WT&Co. 672" on the base. It should be noted that milk glass fragments that likely represent cold cream jars were recovered from 20 other burials; however, all were fragmentary body sherds that precluded a definitive identification.

The remaining identifiable vessels from Potter's Field included tablewares, consisting of tumblers (N=2); household-related items, consisting of an inkbottle (N=1); and personal items, consisting of a nail polish bottle. One of the tumblers, recovered from Burial 526A, is made from solarized glass, which has a date range of 1880 to 1919. The inkbottle is a common umbrella-type form of snap-case manufacture (plate 8-112). A single nail polish bottle was recovered from Burial 793A. This piece had a hexagonal shoulder/base with a round body, and unidentified embossed symbols near the base. The embossment "U.S. Pat'd/11034/2" was present on the base.

PLATE 8-111: Sloan's Liniment Bottle

PLATE 8-112: Ink Bottle

Z. CERAMICS

The recovered ceramic assemblage from Potter's Field included local and imported ware types that date predominantly to the second half of the nineteenth century. The collection consists of whiteware (459 sherds), stoneware (110 sherds), porcelain (27 sherds), ironstone (16 sherds), earthenware (5 sherds), redware/terra-cotta (9 sherds), yellowware (4 sherds), pearlware (11 sherds), transfer printed (22 sherds), English buff slipwares (1 sherd), and 20 unidentified sherds. As noted, minimum numbers of vessels (MNV) were not identified for the ceramic assemblage. All assignable manufacturing date ranges for ceramic wares recovered from Potter's Field, with the exception of a small percentage of pearlware and English slipware, begin in the nineteenth century and continue at least into the beginning of the twentieth century; most date ranges continue well into the twentieth century.

Although a formal MNV analysis was not conducted for the Potter's Field assemblage, vessel form where discernible was noted during the general analysis. Among the identified forms were teacups, plates, saucers, dishes, bowls, mugs, pitchers, toy tea/dinnerware, and flower pots. The assemblage was dominated by serving and tableware vessels. The ceramic wares recovered from Potter's Field were economical and rather plain, often with little or no decoration. These varieties are to be expected among working-class households or large institutions where durable, functional wares are required. Identifiable ceramic vessel forms included a range of tablewares and assorted vessels that were in common use during the late nineteenth and early twentieth centuries. A number of the larger sherds had identifiable makers' marks. These marks often provided a fairly tight date range of manufacture, which may indicate the approximate time of deposition and the possible origin of at least some of the wares found at the Potter's Field burial ground.

The presence of such a large number of ceramic sherds in historic burials is somewhat problematic. Generally, ceramics are not the type of objects normally included with burials from the historic period. This holds particularly true for a potter's field, where the lower socio-economic and/or transient status of many of the interred would theoretically preclude ceramics from being among the recovered grave goods. Therefore, most if not all of the ceramics may be the result of secondary deposition rather than primary intentional inclusion within a particular burial. Nevertheless, the recovered ceramic assemblage may provide valuable information regarding the activities at the various institutions and offices associated with Potter's Field. To that end, the following discussion focuses solely on a representative sample of analytically valuable objects rather than the overall assemblage.

Although most of the assemblage consisted of individual sherds, several complete or nearly complete vessels were recovered. A small dish identified as hard-paste porcelain "Hotel China" was recovered from Burial 523A. This piece had a single red band near the rim and the impressed stamp, "Greenwood China Trenton, NJ," on the base. The Greenwood Pottery operated from 1868 until 1933; the stamp present on this sherd dates to circa 1904 (Kovel and Kovel 1986:177). Another product of a local pottery was recovered from Burial 665A. This piece was an undecorated ironstone plate of indeterminate diameter. The partial stamp "Ironstone/E.T.P. Co." under an indeterminate motif was present on the base. This is the mark of the East Trenton Pottery Company, which manufactured wares from 1888 until about 1905 (Kovel and Kovel 1986:10).

Several European potters were represented in the Potter's Field ceramic assemblage. A nearly complete undecorated bowl with the stamp, "Royal Warranted/Best Ironstone China/Henry Alcock & Co./England," was recovered from Burial 556B/C (Plate 8-113). The Henry Alcock Pottery manufactured wares in Cobridge, Staffordshire, England, from 1861 until 1910; the presence of the country of origin dates this piece to between 1891 and 1910 (Kovel and Kovel 1986:116). A plain ironstone bowl was recovered from Burial 15,287A (Plate 8-114). The stamp, "Alfred Meakin/England," was present on the base. Alfred Meakin, who began manufacturing wares at Turnstall, Staffordshire, England, in 1875, was part of a prominent family of potters that also included Charles, Harry, and Henry, all of whom were actively engaged in ceramic production in Hanley, England, during the late nineteenth/early twentieth centuries (Godden 1964:426-427). This mark has the country of origin, indicating its manufacture after 1891, although the style of lettering suggests a date of circa 1897. Wares produced by Alfred Meakin were widely advertised in the *1897 Sears Catalogue* and *1894-1895 Montgomery-Ward Catalogue,* suggesting that the latest, non-local wares may have been obtained through catalogs by the end of the nineteenth century.

PLATE 8-113: Ironstone Undecorated Bowl

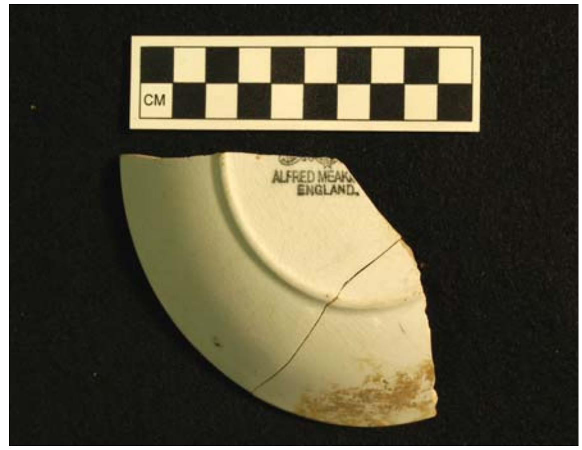


PLATE 8-114: Plain Ironstone Bowl

Interestingly, the wares with identifiable makers' marks predate the time of their associated burial by a minimum of 16 years, and in some cases almost 30 years (Table 8-5). This appears to support the theory that the ceramic assemblage is not directly associated with individual burials, but rather was deposited when a grave was dug and backfilled. If this is the case, then the wares had to be present on the ground surface prior to a section being utilized for burials. It is possible that debris from the institutions or the cemetery office was disposed of in areas that would later become part of Potter's Field. Also, the activities at the nearby pig farm would likely have resulted in the broadcast of close concentrations of refuse over a wide area. This would explain the appearance of objects with no apparent ritual or intrinsic value within the confines of individual burials.

TABLE 8-5

IDENTIFIABLE MARKER'S MARK WITH ASSOCIATED BURIALS

BERGER BURIAL WITH MAKER'S MARK	CLOSEST IDENTIFIED/DATED BERGER BURIAL	BURIAL DATE FOR IDENTIFIED BURIAL	MAKER'S MARK DATE	DIFFERENCE IN YEARS
523A	541 A & B	1934	1904	30
556 B/C	561 A & B	1933	1880-1910	23
665 A	640 A, B, & C	1933	1888-1905	28
741 A	735 A & B	1924	1895-1904	20
15,287 A	15,287 A & B	1913	c. 1897	16

One of the more interesting ware types recovered from Potter's Field was a small amount of pearlware (N=11). The majority of the sherds were plain; however, two identical handpainted bowl fragments were recovered from Burials 15,635A and 15,794A (Plate 8-115). The presence of pearlware may have resulted under the same conditions as the later wares with identifiable makers' marks. However, the origin of this type of ware may be rooted in domestic activities in the area prior to the construction of the various institutions in the late nineteenth century. Pearlware was a transitional ware linking creamware (1762-1820) and whiteware (1815-present). The date range for pearlware is 1775 to about 1840, when it was replaced by the more desirable whiteware and ironstone (1840-present), both of which were more durable and aesthetically closer to porcelain. A single sherd of a ware type even earlier in age than pearlware was also recovered from Potter's Field. This piece, a buff-bodied English slipware body sherd with a "dot" decoration, was recovered from Burial 15,509A. This ware type was manufactured between 1670 and 1795, although the dot decoration indicates its manufacture prior to 1750. A porcelain rimsherd with an elaborate handpainted polychrome overglaze design was recovered from Burial 318A. This piece is similar in appearance to types manufactured in the eighteenth century.

Although the majority of wares were plain, utilitarian vessels, a significant amount of elaborately decorated sherds were recovered from Potter's Field. The most common were transfer-printed whitewares, which came in a variety of designs and colors. Vessel forms for these wares where identified were dominated by flatwares, such as plates and saucers. Other commonly decorated wares recovered from Potter's Field included teacups and pitchers. A mendable teacup with an overglaze decal decoration was recovered from Burial 15,357A (Plate 8-116). This type of decoration first appeared on porcelain vessels in the 1830s and was widely advertised in catalogs of the late nineteenth century. A yellowware pitcher handle sherd with a Rockingham glaze was recovered from Burial 15,353A. This design was manufactured between 1812 and 1920 and was particularly popular during the Victorian period. A handpainted whiteware teacup rimsherd was recovered from Burial 15,468A. A handpainted porcelain saucer rimsherd, probably manufactured in England during the nineteenth century, was recovered from Burial 15,477A. All of these burials were located in the same area and date to either 1921 or 1922. Decorated ceramics in the form of delicate teawares and serving vessels are not typical of the type of austere, high-volume-use wares normally associated with institutional needs. Rather, these vessels may have been used by institution staff, or possibly workers/administrators associated with the burial ground itself. In addition, the concentration of these wares in a discrete area of the burial ground may be an indication of differential disposal patterns between refuse generated by the staff facilities and that originating with the inmate populations.

A number of redware/terra-cotta flower pot sherds (N=9) were found within the burials: three from Burial 387A and one sherd each from Burials 332 A/B, 11,019 A/B, 11,119A, 11,249A, 15,335A, and 15847A/B. These sherds suggest that aesthetic considerations and maintenance were a part of the consciousness of those tending Potter's Field, and administered by either cemetery staff or the families and friends of the deceased.

PLATE 8-115: Glass and Ceramic Fragments with Two Pearlware Sherds

PLATE 8-116: Overglaze Decal Decorated Teacup

AA. FAUNAL REMAINS

Four fragments of non-human bones were recovered from several of the burials. A single pig bone fragment was recovered from Burial 15,406A, and a pig tooth was recovered from Burial 2X. These may be remnants of the pig farm that operated on the site prior to its use as a burial ground. Two additional bones, both non-human and likely food remains, were recovered from Burials 35B and 262A, respectively. Both bones showed evidence of charring, which may be associated with incinerated waste that was deposited nearby. All four non-human bone fragments are likely intrusive, having been on the surface prior to the digging of the graves and subsequently included in the backfill. An additional 11 fragments of clam, mussel, and oyster shells were recovered from Burials 574A/B, 612A, 15,038A/B, 15,408A and 15,422A. These fragments likely resulted from similar circumstances as the faunal remains.

BB. FLORAL REMAINS

A total of 17 floral remains were recovered from Potter's Field. These consist of 10 peanut shell fragments from Burial 11,314A, four peach pit fragments from Burial 11,270A, a peanut shell fragment also from Burial 11,270A, a peach pit from 11,035A, and a peach pit from 11,497A. Although these remains are probably intrusive, the possibility that they represent food remains left behind by the original grave diggers/cemetery workers cannot be discounted.

CC. LITHICS

Two definitive prehistoric lithic artifacts were recovered from Potter's Field. A quartz projectile point identified as an Orient Fishtail was recovered from Burial 634A (Plate 8-117). This type of projectile point is generally dated to between 1200 BC and AD 500. A second prehistoric artifact, identified as a chert flake, was recovered from Burial 15,552A. This represents waste material from the manufacture of stone tools. Both artifacts are almost certainly intrusive and probably originated from the upland surface that would have been habitable during prehistoric times.

PLATE 8-117: Quartz Projectile Point Base

DD. MISCELLANEOUS

The artifacts characterized as Miscellaneous (N=822) typically consisted of modern construction debris, automobile parts, nuts/bolts/screws and other fasteners, tools, ropes/straps, flooring fragments, etc., that were intermixed with the grave shaft soils. The majority of this artifact class bears witness to the function and use of the site after the last interment in 1962.

EE. UNIDENTIFIED FRAGMENTS

Unidentified fragments (N=4,229) included metal, leather, and wood objects the either could not be identified and/or could not be categorized into one of the established functional classes.

FF. SUMMARY DISCUSSION

The artifacts recovered from the Potter's Field burial ground helped to dispel some of the commonly held views associated with these types of sites. Rather than representing a homogeneous group of destitute, nameless individuals, these items indicate the wide variety of social, religious, economic, and ethnic variables present in many of the burials. The significant amount of religious items recovered suggests a deep-rooted spirituality among many of the interred that showed at least a sense of hope for the afterlife, if not for the earthly condition that many were forced to endure. The large number of coins, gold and silver jewelry, and other valuable personal items is contrary to what would be expected in a burial ground composed of the indigent, criminal, or unhealthy. Conversely, the fact that these items were found in the burials is testament to the honesty and integrity of those charged with the preparation and interment of the deceased population. These include the coroner and/or undertaker, hospital staff, and cemetery workers.

The artifact assemblage also provides data on the state of hospitalization and medical knowledge during the late nineteenth/early twentieth centuries. Many of the artifact types found in substantial quantities appear to represent standard issue items given to patients/inmates of the various institutions. Clothing with plain glass or porcelain buttons, shaving brushes and razors, toothbrushes, clay smoking pipes, and possibly even rosaries were among the items that appeared to have been provided to residents of the institutions. Among the clay smoking pipes in particular were ones with the makers' mark "Thewald and Mullenbach Germany." If clay smoking pipes were provided by the institutions, it would indicate that patients in the Tuberculosis Hospital were actually given smoking paraphernalia despite having a chronic disease that attacks the lungs. Supply records of the Hudson County Insane Hospital from July 1924 list a delivery of 60 pounds of smoking tobacco and 40 pounds of plug tobacco to the facility, with another order of similar quantities placed in May 1925 (Figure 8-1). Other likely standard issue items, such as toothbrushes, combs, shaving kits, and clothing, show the great advancement in patient care and comfort since the barbaric treatment of poor and infirmed patients in the first half of the nineteenth century. The possibility that religious objects were supplied by the county institution is particularly intriguing, since it suggests that this practice was not looked upon as a violation of constitutional law regarding the separation of church and state.

Patent medicine and pharmaceutical bottles from the late nineteenth/early twentieth centuries were in use at a time when fraud was at its peak. The contents of many of these were purported to have astounding medicinal properties, sometimes curing as many as 30 different illnesses. One product even claimed to be a cure for both diarrhea *and* constipation. Many of the bottles recovered from Potter's Field may have contained comparable products bearing similar claims, particularly those of local pharmacies, which often fell under the radar of governmental regulations. However, reputable brands, such as Sloan's Liniment and Bromo-Seltzer, were also available and utilized by some of the interred individuals. Overall, this period can be looked upon as a transitional time for medicine, where the effects of smoking were not yet fully understood and the regulation of drugs and medicines and truth in advertising were either lacking, ineffective, or inadequate.

Individuals from widely diverse backgrounds were interred at Potter's Field. Some had at least moderate wealth and/or held a laudable position in society. Decorated military veterans were among the burial population of Potter's Field; among these were at least one known Civil War veteran, one known Spanish-American War veteran, and several World War I veterans. Rather than having been enlisted men of little accomplishment, these individuals clearly identified themselves with military duty and bore the symbols of distinguished service. It is unlikely that the homeless or indigent would have had the ability to retain the physical trappings of military service, which includes medals, ribbons and/or full uniforms. In addition, some burials were distinguished by ornate coffin hardware, expensive jewelry, and other valuable personal items and formal attire, suggesting that they were the remains of people with means or with wealthy relatives and/or friends. As in the case of the military veterans, these more affluent individuals may have been resident in one of the contagious disease hospitals, died there, and were buried in Potter's Field because of fear of contagion.

Other aspects of the Potter's Field project are critical to our understanding of burial practices or, in some cases, the deviation from period burial practices during the late nineteenth/early twentieth centuries. The use of hexagonal coffins during a time when rectangular forms were clearly in vogue was just one of the irregularities evident at Potter's Field. Interestingly, the formaldehyde embalming bottles and lack of physical residue from the use of arsenic indicates that undertakers, coroners, and institution attendants who prepared the interred embraced a process that was considered "cutting edge," particularly in the early years of Potter's Field's use. The presence of burial "pillows" made of brick as well as straw, cotton, feathers, and fabric suggests an expedient preparation of some individuals that was a departure from earlier methods, such as chin straps, to keep the jaw from dropping open. This method appears to have been most prevalent during

Requisition No. 1314

COUNTY OF HUDSON

DEPARTMENT OF

HOSPITAL FOR INSANE

May 7 192 5.

The following goods have been ordered for use in this department.

4000-Yds Canton Flannel
5000- " 48 in. U.B. Muslin

1000-lbs Nucoa Butterine"Best Foods Co."
1-BBl. Vinegar 50-gals.

30-Boxes B.T.B. Soap
60-lbs Smoking Tabacco Veteran
20-lbs Plug. Jolly Tar

1-Gal. Castor Oil

G. P. A. Order No. ....

Goods Received

.... *192*

FIGURE 8-1: Purchase Order from Institution

SOURCE: Hudson County

the years 1909 to 1918, which may be an indication of the preference of a single individual or small group of individuals charged with preparing the deceased for burial during that time period.

Changes in burial ground decorum during the nineteenth century also were evident at Potter's Field, albeit on a moderate scale. The redware flower pot sherds recovered from several burials suggest an attempt to temper the grim surroundings of the burial ground. During the nineteenth century there was a concerted effort by funeral directors and cemetery superintendents to transform cemeteries into picturesque landscapes where grief would be soothed rather than intensified (Simon 1980:59). Thus, the aesthetic considerations represented by the redware flower pots suggest that this trend extended beyond the manicured, park-like private cemeteries of the day to even the socially lower-tier burial places like Potter's Field.

The ethnic, gender, and religious profiles of those interred at Potter's Field reflect the social fabric of late nineteenth/early twentieth-century America. The influx of large numbers of unskilled immigrants from Ireland, Italy, and to a somewhat lesser degree from England, Germany, and the Baltic states exacerbated existing national social problems, such as crime, poverty, alcoholism, disease, and unemployment. These conditions, coupled with a limited access to adequate health care, resulted in a growing segment of the population's becoming dependent on "cradle-to-grave" municipal support that included institutionalization in one of the Hudson County facilities, and, at times, burial in the adjoining Potter's Field.

CHAPTER 9. OSTEOLOGICAL ANALYSIS

A. INTRODUCTION

According to the burial records, the first interment within the Hudson County Burial Grounds occurred in 1880 with the last interment in 1962. As such, it was unknown what type, if any, coffin or casket may have been associated with the most of the burials. It was also unknown what type of embalming techniques or mortuary methods may have been used, or the length of time such embalming, if used, would preserve the body. Thus as part of the initial planning process for the project, the Berger team presumed that calculated decomposition rates for individuals that had no casket and were not embalmed would most likely characterize the Potter's Field burial population. In general, a body left in the open air will decompose in three to five years. A body buried in dry soil will completely decompose (skeletalize) in six to seven years. If the body is interred in moist impervious soil total decomposition may take up to 10 or even 20 years. However, if a body is in a river it will typically skeletalize in two years but in a pond it may not skeletalize for 50 or 60 years. Since Potter's Field was situated immediately adjacent to an estuary with tidal ponds surrounding it, the team prepared for the possibility that soft tissue would be discovered during the disinterment program.

The Turnpike Authority's planned project together with the Court's Final Order and Judgment afforded a unique opportunity to scientifically study the osteological remains from a large late-historic potter's burial ground. Many of the individuals were reported to be first generation immigrants to Hudson County, New Jersey, and to the United States, and thus, this was an excellent opportunity to examine a group of individuals who more than likely passed through the immigrant landing depots at Castle Garden (1855-1890) or Ellis Island (1892-1954). The Potter's Field burial assemblage provided an opportunity to examine the pathologies, diseases, trauma, and congenital abnormalities of this atypical population. It also provided a unique opportunity to observe evidence of early-institutionalized health care in New Jersey. Since the burial ground spanned a time period of over 100 years of continual use, it was anticipated that changes in health and medical practices could be observed over time within this particular burial population.

B. METHODS

An osteological laboratory (where analysis of human skeletal remains was conducted) and a temporary morgue (where the burial remains were carefully stored) were established on-site in the detention center facility. In general, the analytical laboratory was a restricted area due to the sensitivity issues of human remains and out of respect for the deceased; thus, only authorized personnel and invited guests were granted access to the osteological laboratory. At no time during the disinterment program did any of the osteological remains or associated artifacts leave the secured laboratory or temporary morgue maintained at the Potter's Field site.

The osteological laboratory was multi-functional. All disinterred individuals were carried directly from the field to the on-site laboratory where they were checked-in. Each container was visually inspected and the field burial form was checked against the contents of the container for accuracy. At this time, a detailed artifact list was compiled for each burial. The noteworthy artifacts were given to the historic archaeologist who was working in the separate but adjacent archaeological field laboratory for further identification and photography. If a set of human remains was selected to undergo further osteological analyses, the skeletal remains were cleaned (dry brushed or carefully washed with water when absolutely necessary), and laid out on a board for slow but complete drying followed by analysis. No destructive analyses were performed on any of the skeletal remains examined. Photographs of pathologies were taken in the field laboratory. When both the osteological and artifactual analyses for a particular individual or burial was completed, the associated artifacts, if any, were placed back in the same container as the skeletal remains and the burial was checked-out of the osteological laboratory and checked-into the temporary morgue for storage and temporary curation.

1. Osteological Sampling

Assignments of gender, age, and stature were made for all disinterments where the skeletal remains were sufficient to make such determinations. Thus, while most of the recovered burial population received this baseline level of osteological analysis, another subset of the Potter's Field burial population was selected for more extensive osteological examination.

The sampling strategy for the more extensive osteological analysis was initially designed to result in a five percent sample of the total burial population, spatially distributed both horizontally and vertically across Potter's Field. While this was the underlying basis that drove this sampling strategy, it soon became readily apparent that the configuration and extant of the burial ground was uncertain and that additional analysis could provide data critical to understanding the general layout of Potter's Field. Therefore, while continuing to attempt to analyze a representational spatial sample of the burial population, exceptions were made in order to respond to specific questions that arose based on unanticipated discoveries encountered during the field excavations. From a burial population of 4,571 disinterred individuals, 409 skeletons or 8.9 percent of the total burial population from Potter's Field were selected to undergo extensive osteological analysis. Figure 9-1 indicates the location of all individuals that were selected for more extensive osteological analyses.

One objective for undertaking this more extensive level of osteological analysis was to corroborate the results of the field identifications of gender, age, and stature. The field conditions were often quite muddy which created the potential for skeletal identification and measurement errors in the field. The most common result of the muddy conditions was that certain traits simply could not be observed in the field and thus, marked "unknown" for age or gender. During the check-in process, the human remains were examined and the initial examination was then compared with the field burial form to check for any major identification errors. Corrections, additional information, and/or supplemental observations could be noted on the field burial form at this time. In addition, this process also allowed the field excavators to alert the laboratory of burials or skeletons that they felt warranted additional analysis.

Besides the spatial representativeness of a particular burial, preservation of the skeletal remains was also determinate in determining whether or not to conduct further osteological analysis. The preservation or condition of the skeletal remains from Potter's Field varied from poor to excellent (Chart 9-1). A large segment of the burial population was too deteriorated to justify further analysis and therefore the sample attempted to focus on the better-preserved remains whenever possible. An individual was occasionally selected if the mortuary assemblage (personal effects and artifacts) was unique and/or extraordinary in order to build a case study and/or to provide an interpretation for the unusual amount or type of artifacts that were associated with the individual.

The burial register indicated that there were not many children buried at the Hudson County Burial Ground and that a small number of amputated limbs were given formal burials. Based on these data, children and some amputated limbs were selected as part of the sample for additional osteological analysis in an effort to assist in matching Berger's identified grave shafts to the historic maps.

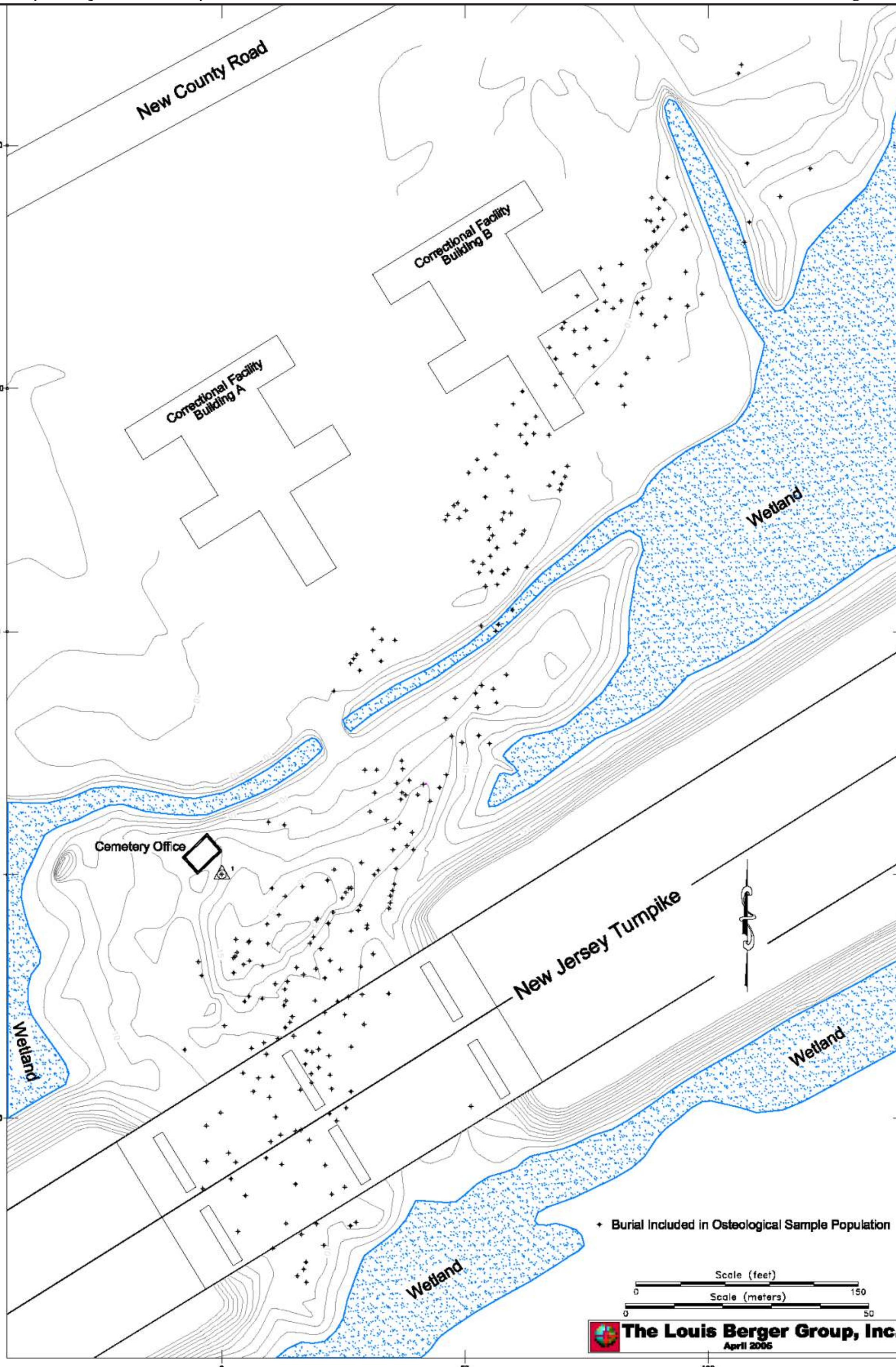
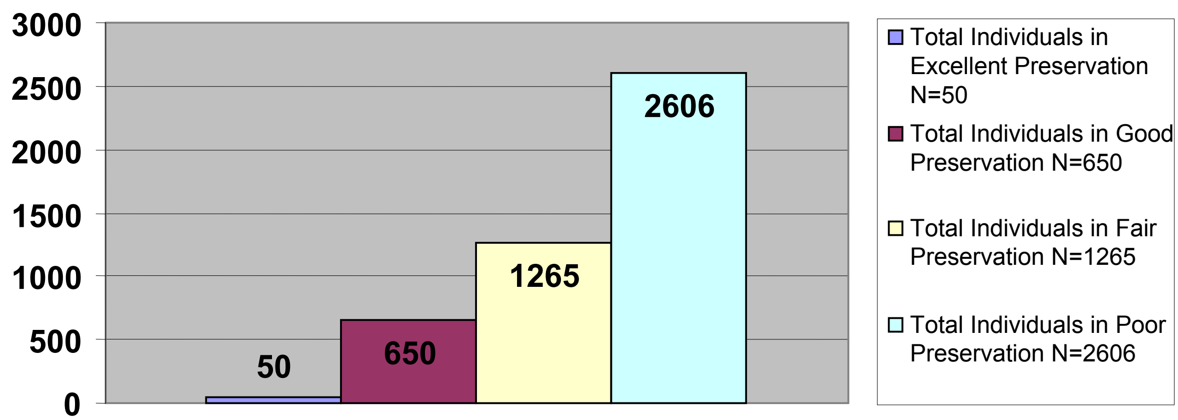


FIGURE 9-1: Location of Osteological Sample Population

CHART 9-1
Preservation of Potter's Field Burial Population



Occasionally coffin number plates and/or name plates were recovered in association with specific burials. These number plates were once attached to the coffin and the burial register listed these numbers in association with a specific deceased individual. Unfortunately, the numbering sequence in the burial register was not unique. As such, the burial register often contained five identical numbers listed for five different individuals from different time periods, different cities, or different morticians. In order to assign the correct name from the burial register to the skeletal remains, the individuals with coffin number plates and their shaft mates (part of the pattern analysis program) were selected for additional osteological analysis in an effort to determine exact gender, age, and stature. Unfortunately, the majority of these individuals were in a poor state of preservation. Once the individual was positively identified by combining the detailed osteological examination with the coffin plate number, the burial register was used to determine year of death. This process enabled dates to be attached to the different sections of Potter's Field (corroborated by associated artifacts) which lead to a more accurately interpretation of the configuration and expansion of the burial ground.

It was determined that individuals that still had soft tissue would not be included in the sample due to potential health risks, possible infestation, and odor. Slightly over two percent of the burial population (N=105) had soft tissue and were eliminated from the sample. However, there was an exception for ten individuals (or 0.2 percent of the burial population) with soft tissue that presented either artifactual assemblages or mortuary patterns so atypical as to warrant additional investigation, including more detailed osteological or forensic examination.

Another aspect of the analysis included an attempt to identify two specific individuals whose relatives came forward and wanted to claim their ancestors for reburial. Therefore, the sample was again skewed to meet these requests. The one individual was reported to be a tall gentleman so all individuals over 6'1" in height were included in the osteological analysis sample. The other individual was known to have been buried in a certain area and – since the historic and modern burial maps did not align – it was necessary to sample heavily in the general area where this specific individual was believed to have been interred in order to identify the remains of that individual.

2. Corroboration of the Field Observations

For every individual that underwent additional osteological analysis (N=409 individuals) the field burial form was reviewed in the laboratory while the additional osteological analysis was being performed. This afforded an opportunity to check the accuracy of the field forms and allowed the osteologist to correct and/or add observations and comments to the burial form prior to the final printing. When recurrent issues of accuracy arose, they were addressed with the field archaeologists during additional training sessions conducted throughout the course of the project.

3. Osteometrics

Osteometrics refers to the measurement of bones. Skeletal measurements are taken in millimeters. Many measurements can be taken on the human skeleton and various tools are utilized to capture these measurements. Measurements assist in the identification of age, gender, stature, and activity/occupation. Cranial and post-cranial measurements are also used to describe individuals and to compare burial populations.

The osteometric board was used to measure the length of long bones. This measurement is then inserted into a formula to calculate the stature of an individual (after Trotter 1970). Sliding calipers were used when the reference points for the measurement were relatively close together. Spreading calipers were designed to measure areas of the skull that are not possible to measure with the sliding calipers due to the curvature and undulating surfaces of the skull.

The minimum standard required for documentation of all collections was applied to this assemblage as listed in the *Standards for Data Collection from Human Skeletal Remains*. A total of 78 measurements were taken for each individual – if the bones were complete. This includes 24 cranial, 10 mandibular, and 44 postcranial measurements in this osteometric data set. These measurements are described below (illustrations are from Buikstra and Ubelaker 1994 after Moore-Jansen *et al*. 1994).

1. Maximum Cranial Length (g-op): the distance between glabella (the most anterior midline point on the frontal bone, usually above the frontonasal suture in the midsagittal plane) and opisthocranion (op) (the most posterior point of the skull not on the external occipital protuberance, measured in a straight line (Figure 9-2). Measurement was taken with a spreading caliper.

2. Maximum Cranial Breadth (eu-eu): the maximum width of the skull perpendicular to the midsagittal plane where it is located with the exception of the inferior temporal lines and the area immediately surrounding them (see Figure 9-2). Measurement was taken with a spreading caliper.

3. Bizygomatic Diameter (zy-zy): direct distance between most lateral points on the zygomatic arches (zy-zy) (see Figure 9-2). Measurement was taken with a spreading caliper.

4. Basion-Bregma Height (ba-b): direct distance from the lowest point on the anterior margin of the foramen magnum (ba) to bregma (b) (see Figure 9-2). Measurement was taken with a spreading caliper.

5. Cranial Base Length (ba-n): direct distance from nasion (n) to basion (ba) (see Figure 9-2). Measurement was taken with a spreading caliper.

6. Basion-Prosthion Length (ba-pr): direct distance from basion (ba) to prosthion (pr) (see Figure 9-2). Measurement was taken with a spreading caliper.

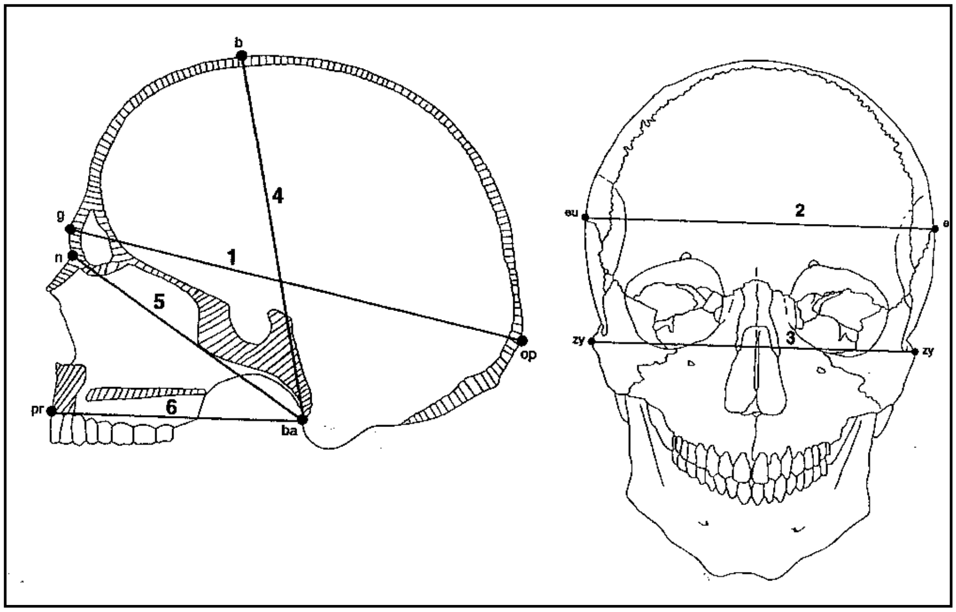


FIGURE 9-2: Osteometric Measurements of the Human Skull, Numbers 1 thru 6 (Buikstra and Ubelaker 1994)

7. Maxillo-AlveolarBreadth (ecm-ecm): maximum breadth across the alveolar borders of the maxilla measured on the lateral surfaces at the location of the second maxillary molars (ecm) (Figure 9-3). Measurement was taken with a spreading caliper.

8. Maxillo-Alveolar Length (pr-alv): direct distance from prosthion (pr) to alveolon (alv) (see Figure 9-3). Measurement was taken with a sliding caliper.

9. Biauricular Breadth (au-au): least exterior breadth across the roots of the zygomatic processes (au), wherever found (see Figure 9-3). Measurement was taken with a sliding caliper.

10. Upper Facial Height (n-pr): direct distance from nasion (n) to prosthion (pr) (see Figure 9-3). Measurement was taken with a sliding caliper.

11. Minimum Frontal Breadth (ft-ft): direct distance between the two frontotemporale (ft) (see Figure 9-3). Measurement was taken with a sliding caliper.

12. Upper Facial Breadth (fmt-fmt): direct distance between the two external points on the frontomalar suture (fmt) (see Figure 9-3). Measurement was taken with a sliding caliper.

13. Nasal Height (n-ns): direct distance from nasion (n) to the midpoint of a line connecting the lowest points of the inferior margin of the nasal notches (ns) (see Figure 9-3). Measurement was taken with a sliding caliper.

14. Nasal Breadth (al-al): maximum breadth of the nasal aperture (al-al) (see Figure 9-3). Measurement was taken with a sliding caliper.

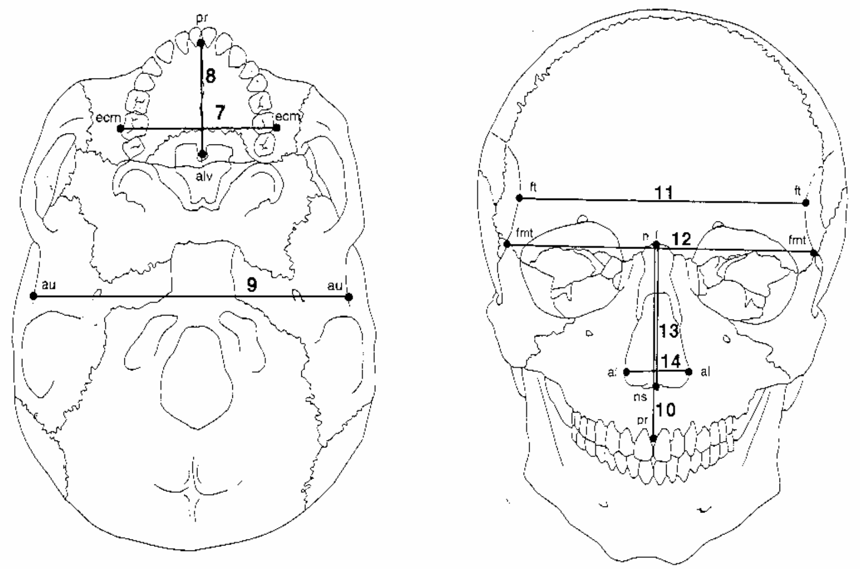


Figure 39. Cranial measurements, basilar view (after Moore-Jansen et al. 1994).

Figure 40. Cranial measurements, anterior view (after Moore-Jansen et al. 1994).

FIGURE 9-3: Osteometric Measurements of the Human Skull, Numbers 7 thru 14 (Buikstra and Ubelaker 1994)

15. Orbital Breadth (d-ec): laterally sloping distance from dacryon (d) to ectoconchion (ec) (Figure 9-4). Measurement was taken with a sliding caliper.

16. Orbital Height: direct distance between the superior and inferior orbital margins (see Figure 9-4). Measurement was taken with a sliding caliper.

17. Bi-orbital Breadth (ec-ec): direct distance between right and left ectoconchion (ec) (see Figure 9-4). Measurement was taken with a sliding caliper.

18. Interorbital Breadth (d-d): direct distance between right and left dacryon (d) (see Figure 9-4). Measurement was taken with a sliding caliper.

19. Frontal Chord (n-b): direct distance from nasion (n) to bregma (b) taken in the midsagittal plane (see Figure 9-4). Measurement was taken with a sliding caliper.

20. Parietal Chord (b-l): direct distance from bregma (b) to lambda (l) taken in the midsagittal plane (see Figure 9-4). Measurement was taken with a sliding caliper.

21. Occipital Chord (l-o): direct distance from lambda (l) to opisthion (o) taken in the midsagittal plane (see Figure 9-4). Measurement was taken with a sliding caliper.

22. Foramen Magnum Length (ba-o): direct distance from basion (ba) to opisthion (o) (Figure 9-5). Measurement was taken with a sliding caliper.

23. Foramen Magnum Breadth: distance between the lateral margins of the foramen magnum at the points of greatest lateral curvature (see Figure 9-5). Measurement was taken with a sliding caliper.

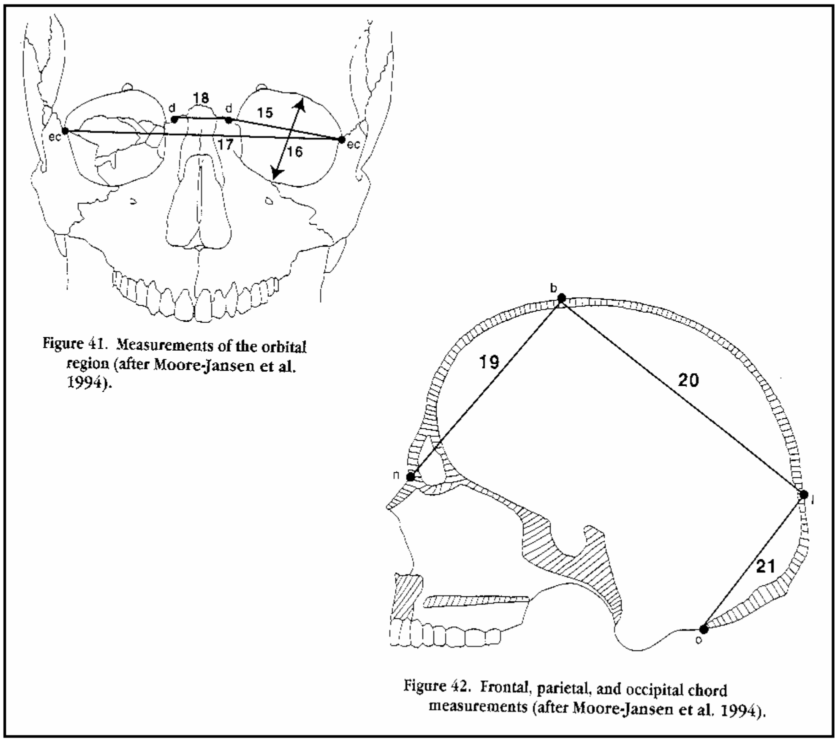


Figure 41. Measurements of the orbital region (after Moore-Jansen et al. 1994).

Figure 42. Frontal, parietal, and occipital chord measurements (after Moore-Jansen et al. 1994).

FIGURE 9-4: Osteometric Measurements of the Human Skull, Numbers 15 thru 21 (Buikstra and Ubelaker 1994)

24. Mastoid Length: vertical projection of the mastoid process below and perpendicular to the eye-ear (Frankfort) plane (see Figure 9-5). Measurement was taken with a sliding caliper.

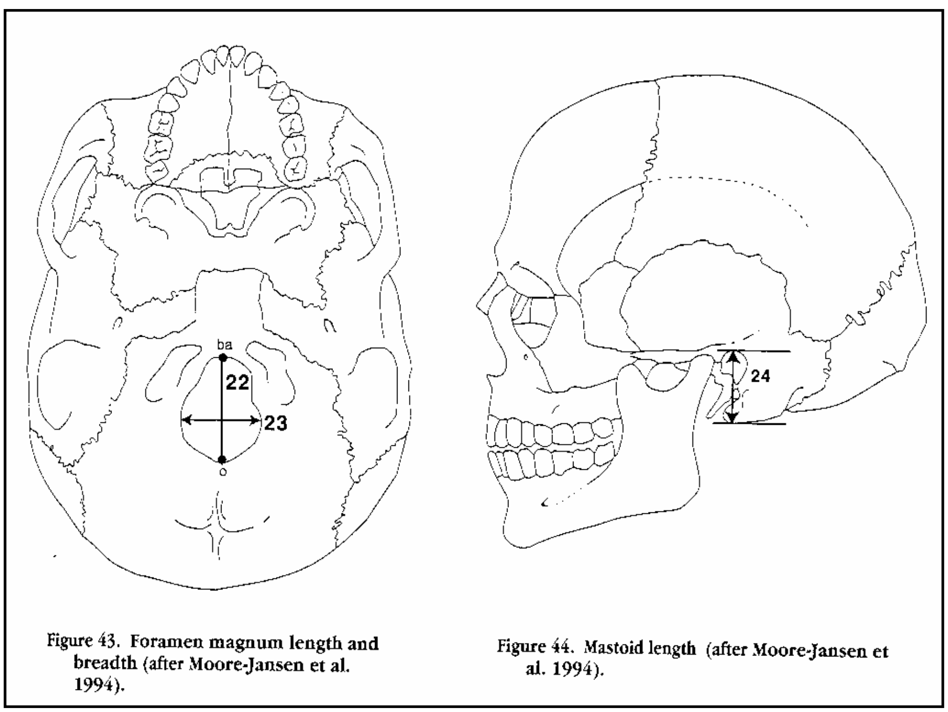


Figure 43. Foramen magnum length and breadth (after Moore-Jansen et al. 1994).

Figure 44. Mastoid length (after Moore-Jansen et al. 1994).

FIGURE 9-5: Osteometric Measurements of the Human Skull, Numbers 22 thru 24 (Buikstra and Ubelaker 1994)

25. Chin Height (id-gn): direct distance from infradentale (id) to gnathion (gn) (Figure 9-6). Measurement was taken with a sliding caliper.

26. Height of the Mandibular Body: direct distance from the alveolar process to the inferior border of the mandible perpendicular to the base at the level of the mental foramen (see Figure 9-6). Measurement was taken with a sliding caliper.

27. Breadth of the Mandibular Body: maximum breadth measured in the region of the mental foramen perpendicular to the long axis of the mandibular body (see Figure 9-6). Measurement was taken with a sliding caliper.

28. Bigonial Width (go-go): direct distance between the right and left gonion (go) (see Figure 9-6). Measurement was taken with a sliding caliper.

29. Bicondylar Breadth (cdl-cdl): direct distance between the most lateral points on the two condyles (cdl) (see Figure 9-6). Measurement was taken with a sliding caliper.

30. Minimum Ramus Breadth: least breadth of the mandibular ramus measured perpendicular to the height of the ramus (see Figure 9-6). Measurement was taken with a sliding caliper.

31. Maximum Ramus Breadth: distance between the most anterior point on the mandibular ramus and a line connecting the most posterior point on the condyle and the angle of the jaw (see Figure 9-6). Measurement was taken with a sliding caliper.

32. Maximum Ramus Height: direct distance from the highest point on the mandibular condyle to gonion (go) (see Figure 9-6). Measurement was taken with a sliding caliper.

33. Mandibular Length: distance of the anterior margin of the chin from a center point on the projected straight-line place along the posterior border of the two mandibular angles (see Figure 9-6). Measurement was taken with a sliding caliper and straight edge.

34. Mandibular Angle: angle formed by the inferior border of the corpus and the posterior border of the ramus (see Figure 9-6). Measurement was taken with a protractor.

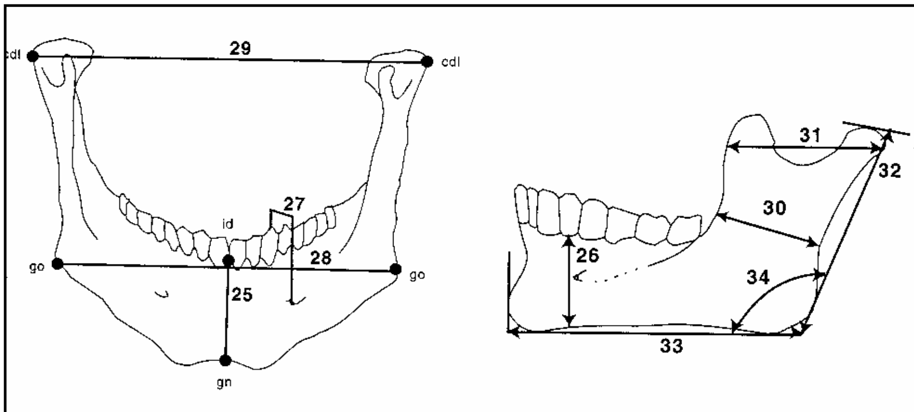


Figure 45. Measurements of the mandible, anterior view (after Moore-Jansen et al. 1994).

Figure 46. Measurements of the mandible, lateral view (after Moore-Jansen et al. 1994).

FIGURE 9-6: Osteometric Measurements of the Human Skull, Numbers 25 thru 34 (Buikstra and Ubelaker 1994)

35. Clavicle: Maximum Length: maximum distance between the most extreme ends of the clavicle (Figure 9-7). Measurement was taken on an osteometric board.

36. Clavicle: Sagittal (Anterior-Posterior) Diameter at Midshaft: distance from the anterior to the posterior surface at midshaft (see Figure 9-7). Measurement was taken with an osteometric board and sliding calipers.

37. Clavicle: Vertical (Superior-Inferior) Diameter at Midshaft: distance from the superior to the inferior surface at midshaft (see Figure 9-7). Measurement was taken with a sliding caliper.

38. Scapula: Height (Anatomical Breadth): direct distance from the most superior point of the cranial angle to the most inferior point on the caudal angle (see Figure 9-7). Measurement was taken with a sliding caliper.

39. Scapula: Breadth (Anatomical Length): distance from the midpoint on the dorsal border of the glenoid fossa to midway between the two ridges of the scapular spine on the vertebral border (see Figure 9-7). Measurement was taken with a spreading caliper.

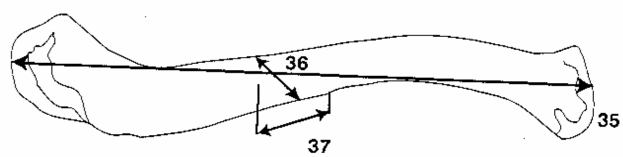


Figure 47. Measurements of the left clavicle, superior view (after Moore-Jansen et al. 1994).

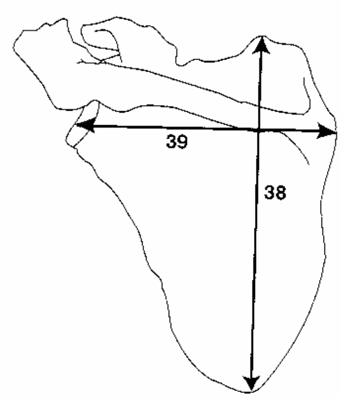


Figure 48. Measurements of the left scapula, dorsal view (after Moore-Jansen et al. 1994).

FIGURE 9-7: Osteometric Measurements of the Human Skeleton, Numbers 35 thru 39 (Buikstra and Ubelaker 1994)

40. Humerus: Maximum Length: direct distance from the most superior point on the head of the humerus to the most inferior point on the trochlea (Figure 9-8). Measurement was taken with an osteometric board.

41. Humerus: Epicondylar Breadth: distance of the most laterally protruding point on the lateral epicondyle from the corresponding projection of the medial epicondyle (see Figure 9-8). Measurement was taken with an osteometric board.

42. Humerus: Vertical Diameter of Head: direct distance between the most superior and inferior points on the border of the articular surface (see Figure 9-8). Measurement was taken with a sliding caliper.

43. Humerus: Maximum Diameter at Midshaft: maximum diameter at midshaft (see Figure 9-8). Measurement was taken with an osteometric board and a sliding caliper.

44. Humerus: Minimum Diameter at Midshaft: minimum diameter of midshaft (see Figure 9-8). Measurement was taken with an osteometric board and a sliding caliper.

45. Radius: Maximum Length: distance from the most proximally positioned point on the head of the radius to the tip of the styloid process without regard for the long axis of the bone (see Figure 9-8). Measurement was taken on an osteometric board.

46. Radius: Anterior-Posterior (Sagittal) Diameter at Midshaft: distance between anterior and posterior surfaces at midshaft (see Figure 9-8). Measurement was taken on an osteometric board and a sliding caliper.

47. Radius: Medial-Lateral (Transverse) Diameter at Midshaft: distance between medial and lateral surfaces at midshaft (see Figure 9-8). Measurement was taken with a sliding caliper.

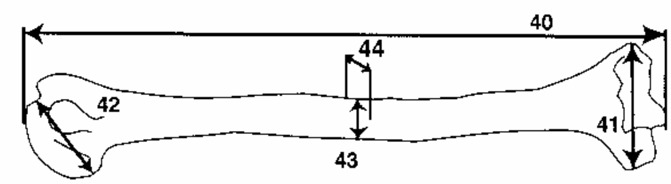


Figure 49. Measurements of the left humerus, anterior view (after Moore-Jansen et al. 1994).

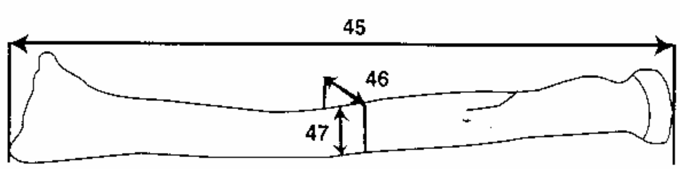


Figure 50. Measurements of the left radius, anterior view (after Moore-Jansen et al. 1994).

FIGURE 9-8: Osteometric Measurements of the Human Skeleton, Numbers 40 thru 47(Buikstra and Ubelaker 1994)

48. Ulna: Maximum Length: distance from the most superior point on the olecranon to the most inferior point on the styloid process (Figure 9-9). Measurement was taken on an osteometric board.

49. Ulna: Anterior-Posterior (Dorso-Volar) Diameter: maximum diameter of the diaphysis at the level of greatest crest development in anterior-posterior (dorso-volar) plane (see Figure 9-9). Measurement was taken with a sliding caliper.

50. Ulna: Medial-Lateral (Transverse) Diameter: distance between medial and lateral surfaces at the level of greatest crest development (see Figure 9-9). Measurement was taken with a sliding caliper.

51. Ulna: Physiological Length: distance between the most distal (inferior) point on the surface of the coronoid process and the most distal point on the inferior surface of the distal head of the ulna (see Figure 9-9). Measurement was taken with a spreading caliper.

52. Ulna: Minimum Circumference: least circumference near the distal end of the bone (see Figure 9-9). Measurement was taken with a tape measure.

53. Sacrum: Anterior Length: distance from a point on the promontory positioned in the midsagittal plane to a point on the anterior border of the tip of the sacrum measured in the midsagittal plane (see Figure 9-9). Measurement was taken with a sliding caliper.

54. Sacrum: Anterior Superior Breadth: maximum transverse breadth of the sacrum at the level of the anterior projection of the auricular surface (see Figure 9-9). Measurement was taken with a sliding caliper.

55. Sacrum: Maximum Transverse Diameter of Base: direct distance between the two most laterally projecting pints on the sacral base measured perpendicular to the midsagittal plane (see Figure 9-9). Measurement was taken with a sliding caliper.

56. Os Coxae Height: distance from the most superior point on the iliac crest to the most inferior point on the ischial tuberosity (Figure 9-10). Measurement was taken with a spreading caliper.

57. Os Coxae: Iliac Breadth: distance from the anterior-superior iliac spine to the posterior-superior iliac spine (see Figure 9-10). Measurement was taken with a spreading caliper.

58. Os Coxae: Pubis Length: distance from the point in the acetabulum where the three elements of the os coxae meet to the upper end of the pubic symphysis (see Figure 9-10). Measurement was taken with a sliding caliper.

59. Os Coxae: Ischium Length: distance from the point in the acetabulum where the three elements meet to the point in which the axis of the ischium crosses the ischial tuberosity (see Figure 9-10). Measurement was taken with a sliding caliper.

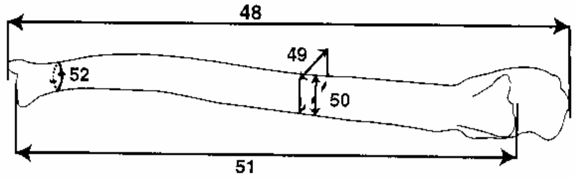


Figure 51 Measurements of the left ulna, anterior view (after Moore-Jansen et al. 1994).

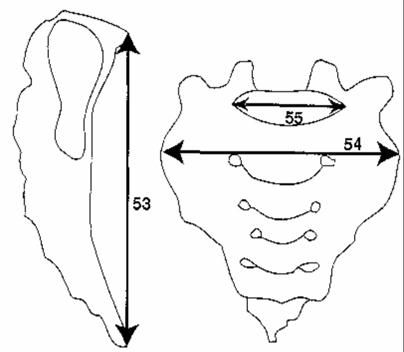


Figure 52. Measurements of the sacrum (after Moore-Jansen et al. 1994).

FIGURE 9-9: Osteometric Measurements of the Human Skeleton, Numbers 48 thru 55 (from Buikstra and Ubelaker 1994)

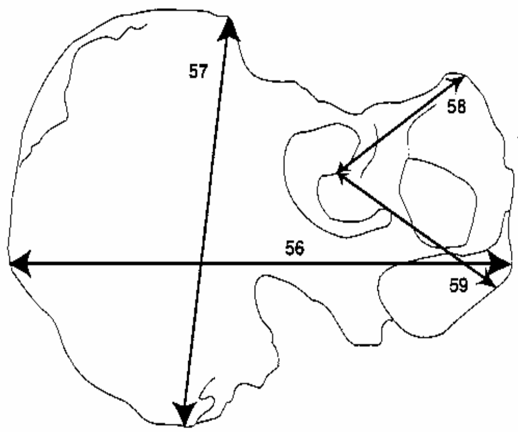


Figure 53. Measurements of the os coxae (after Moore-Jansen et al. 1994).

FIGURE 9-10: Osteometric Measurements of the Human Skeleton, Numbers 56 thru 59 (Buikstra and Ubelaker 1994)

60. Femur: Maximum Length: distance from the most superior point on the head of the femur to the most inferior point on the distal condyles (Figure 9-11). Measurement was taken on an osteometric board.

61. Femur: Bicondylar Length: distance from the most superior point on the head to a plane drawn along the inferior surfaces on the distal condyles (see Figure 9-11). Measurement was taken on an osteometric board.

62. Femur: Epicondylar Breadth: distance between the two most laterally projecting points on the epicondyles (see Figure 9-11). Measurement was taken on an osteometric board.

63. Femur: Maximum Head Diameter: the maximum diameter of the femur head, wherever it occurs (see Figure 9-11). Measurement was taken with a sliding caliper.

64. Femur: Anterior-Posterior (Sagittal) Subtrochanteric Diameter: distance between anterior and posterior surfaces at the proximal end of the diaphysis, measured perpendicular to the medial-lateral diameter (see Figure 9-11). Measurement was taken with a sliding caliper.

65. Femur: Medial-Lateral (Transverse) Subtrochanteric Diameter: distance between medial and lateral surfaces of the proximal end of the diaphysis at the point of its greatest lateral expansion below the base of the lesser trochanter (see Figure 9-11). Measurement was taken with a sliding caliper.

66. Femur: Anterior-Posterior (Sagittal) Midshaft Diameter: distance between anterior and posterior surfaces measured approximately at the midpoint of the diaphysis, at the highest elevation of linea aspera (see Figure 9-11). Measurement was taken with a sliding caliper.

67. Femur: Medial-Lateral (Transverse) Midshaft Diameter: distance between the medial and lateral surfaces at midshaft, measured perpendicular to the anterior-posterior diameter (see Figure 9-11). Measurement was taken with a sliding caliper.

68. Femur: Midshaft Circumference: circumference measured at the level of the midshaft diameter. If the linea aspera exhibits a strong projection, which is not evenly expressed across a large portion of the diaphysis, then this measurement is recorded approximately ten millimeters above the midshaft (see Figure 9-11). Measurement was taken with a tape measure.

69. Tibia: Length: distance from the superior articular surface of the lateral condyle to the tip of the medial malleolus (see Figure 9-11). Measurement was taken on an osteometric board.

70. Tibia: Maximum Proximal Epiphyseal Breadth: maximum distance between the two most laterally projecting points on the medial and lateral condyles of the proximal articular region (epiphysis) (see Figure 9-11). Measurement was taken on an osteometric board.

71. Tibia: Maximum Distal Epiphyseal Breadth: maximum distance between the two most laterally projecting points on the medial malleolus and the lateral surface of the distal articular region (epiphysis) (see Figure 9-11). Measurement was taken on an osteometric board.

72. Tibia: Maximum Diameter at the Nutrient Foramen: distance between the anterior crest and the posterior surface at the level of the nutrient foramen (see Figure 9-11). Measurement was taken with a sliding caliper.

73. Tibia: Medial-Lateral (Transverse) Diameter at the Nutrient Foramen: straight-line distance of the medial margin from the interosseous crest at the level of the nutrient foramen (see Figure 9-11). Measurement was taken with a sliding caliper.

74. Tibia: Circumference at the Nutrient Foramen: circumference measured at the level of the nutrient foramen (see Figure 9-11). Measurement was taken with a tape measure.

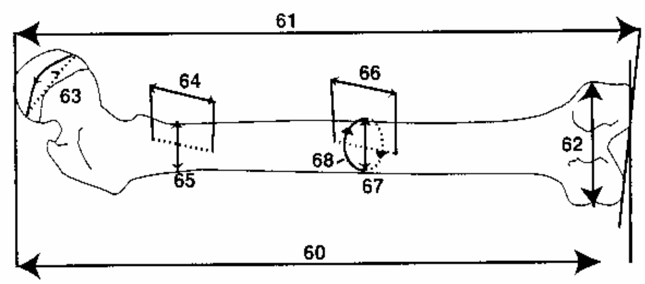


Figure 54. Measurements of the left femur, posterior view (after Moore-Jansen et al. 1994).

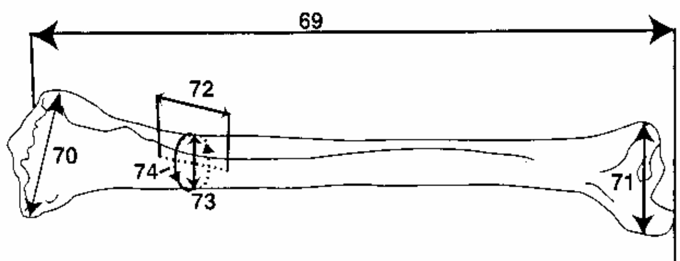


Figure 55. Measurements of the left tibia, anterior view (after Moore-Jansen et al. 1994).

FIGURE 9-11: Osteometric Measurements of the Human Skeleton, Numbers 60 thru 74 (Buikstra and Ubelaker 1994)

75. Fibula: Maximum Length: maximum distance between the most superior point on the fibula head and the most inferior point on the lateral malleolus (Figure 9-12). Measurement was taken on an osteometric board.

76. Fibula: Maximum Diameter at Midshaft: maximum diameter at midshaft (see Figure 9-12). Measurement was taken with a sliding caliper.

77. Calcaneus: Maximum Length: distance between the most posteriorly projecting point on the tuberosity and the most anterior point on the superior margin of the articular facet for the cuboid measured in the sagittal plane and projected onto the underlying surface (see Figure 9-12). Measurement was taken with a sliding caliper.

78. Calcaneus: Middle Breadth: distance between the most laterally projecting point on the dorsal articular facet and the most medial point on the sustentaculum tali (see Figure 9-12). Measurement was taken with a sliding caliper.

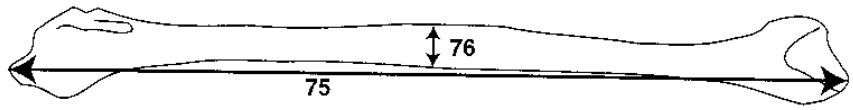


Figure 56. Measurements of the left fibula, lateral view (after Moore-Jansen et al. 1994).

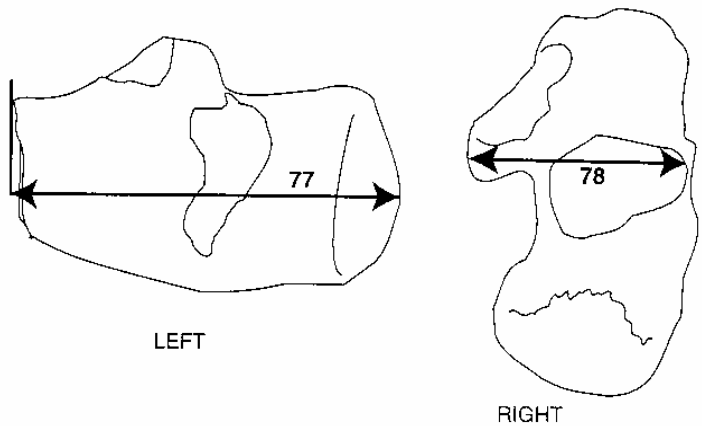


Figure 57. Measurements of the calcaneus (after Moore-Jansen et al. 1994).

FIGURE 9-12: Osteometric Measurements of the Human Skeleton, Numbers 75 thru 78 (Buikstra and Ubelaker 1994)

4. Non-Metric Skeletal Traits and Analysis

Nonmetric (discrete) traits are non-pathological variations of skeletal material that are genetically inherited. There are four forms of non-metric traits; these are: (1) ossicles (small extra bones found within the cranial sutures), (2) extra bone growth in the form of spurs or bridges, (3) bones that have not ossified, and (4) variability in the location and number of foramen. These traits are observable but not measurable and thus, are scored as present or absent.

In this study non-metric traits were recorded as a matter of routine following the guidelines set forth in the *Standards for Data Collection from Human Skeletal Remains* (Buikstra and Ubelaker 1994). Buikstra and Ubelaker (1994) identify twenty-four variations of non-metric traits that are considered of primary importance. These variations are listed below.

1. Metopic Suture: Located on the midline of the frontal bone, from bregma to nasion.Persistence of the sutura interfrontalis, which usually closes by the eighth year. The suture may be completely retained or may only extend a short distance from Nasion (Figure 9-13).

2. Supraorbital Structures: Notches and/or foramina may be present at the supra orbital margin of the frontal bone (see Figure 9-13).

3. Infraorbital Suture: Located on the facial surfaces (see Figure 9-13).

4. Multiple Infraorbital Foramina: Foramina situated on the external anterior surface of the maxilla below the infraorbital margin, above the canine fossa (see Figure 9-13).

5. Zygomatico-facial Foramina: Foramina located on the facial surface of zygomatic (malar) bone (see Figure 9-13).

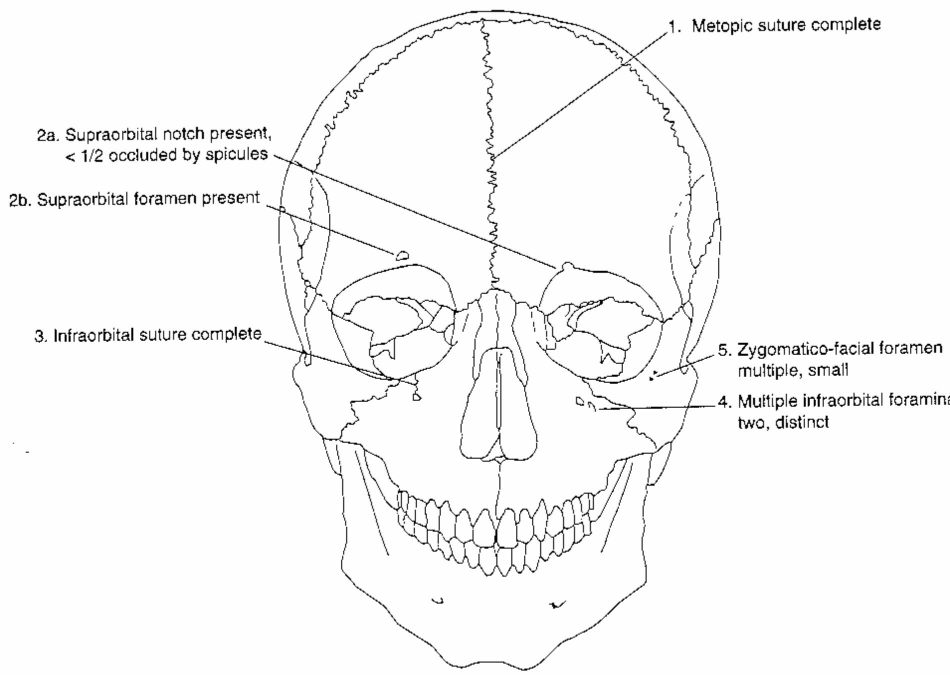


Figure 58. Frontal view of cranial vault illustrating locations of metopic suture, supraorbital notch, supraorbital foramen, infraorbital suture, zygomatico-facial foramina, and infraorbital foramina.

FIGURE 9-13: Location Of Nonmetric Traits in the Human Skull, Numbers 1 thru 5 (Buikstra And Ubelaker 1994)

6. Parietal (Obelionic) Foramen: Located on the parietal bone, within or near the suture at obelion (Figure 9-14).

7. Sutural Bones: Ossicles located at specific points in the cranial vault (see Figure 9-14).
   a. Epipteric Bone: Located at the junction of the frontal, parietal, temporal, and sphenoid bones.
   b. Coronal Ossicle: Located within the coronal suture.
   c. Bregmatic Bone: located at the junction of paired parietals and frontal, formed within anterior fontanelle.
   d. Sagittal Ossicle: Located within the sagittal suture.
   e. Apical Bone: Located at lambda, within posterior fontanelle.
   f. Lambdoid Ossicle: Located within lambdoid suture.
   g. Asterionic Bone: Located at the junction of the occipital, parietal, and temporal bones.
   h. Ossicle in Occipito-Mastoid Suture: Located in suture between temporal and occipital bones.

i. Parietal Notch Bone: Ossicle located within parietal notch, between squamous portion of the temporal and parietal bones.

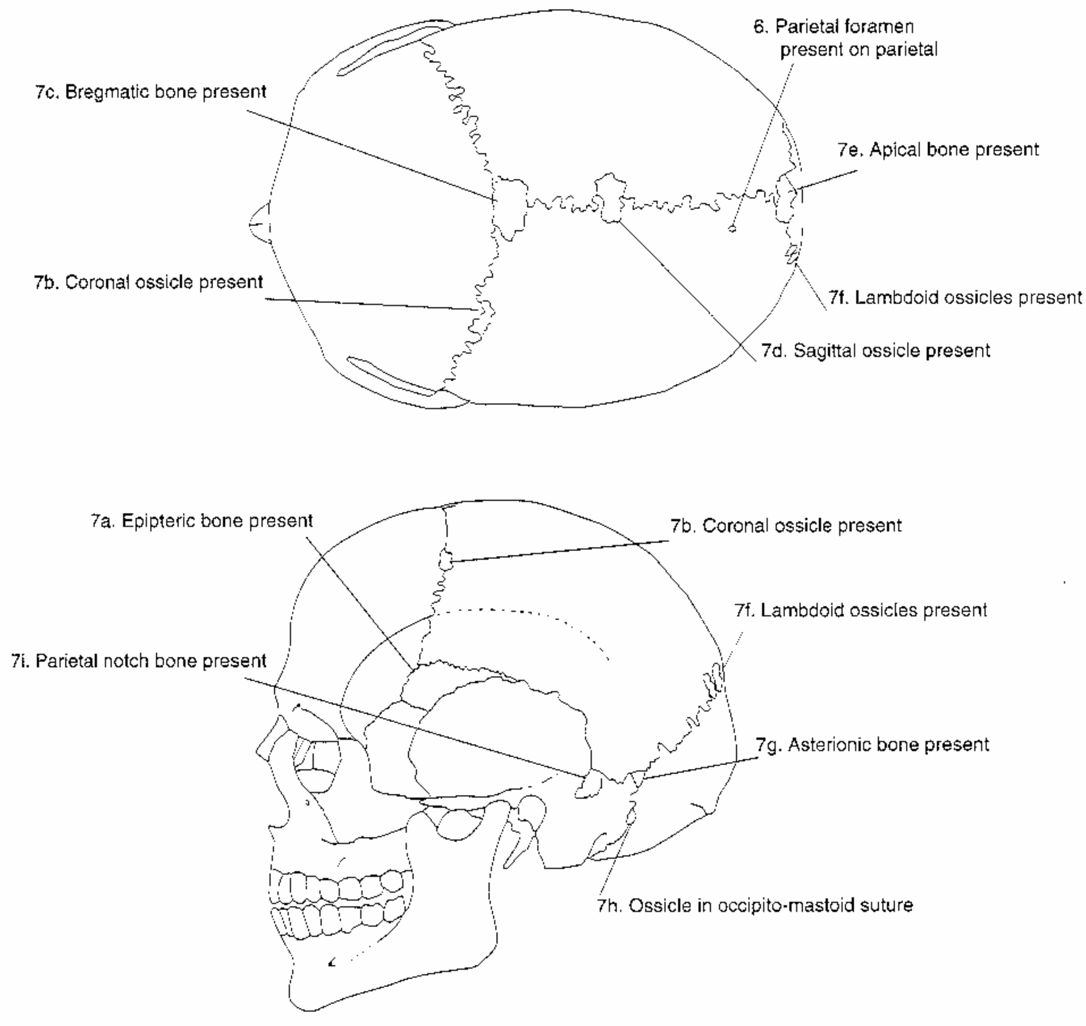


Figure 59. Superior and lateral aspect of cranial vault illustrating locations of parietal foramina and the sutural bones.

FIGURE 9-14: Location of Nonmetric Traits in the Human Skull, Numbers 6 thru 7a-i (from Buikstra and Ubelaker 1994:88)

8. Inca Bone: Failure of fusion of the primary ossification centers of the squamous portion of the occipital bone (Figure 9-15).

9. Condylar Canal: Canal opening within the condylar fossa, posterior to the occipital condyles (see Figure 9-15)

10. Divided Hypoglossal Canal: The hypoglossal canal is located superior to the occipital condyle, normally at an angle perpendicular to the main axis of the condyle. The hypoglossal canal can be divided by spines located within the canal or on the internal aspect adjacent to the foramen magnum (see Figure 9-15).

11. Direction of Flexure for Superior Sagittal Sulcus: The superior sagittal sulcus most commonly flexes right. Variations include left flexure and bifurcation (see Figure 9-15).

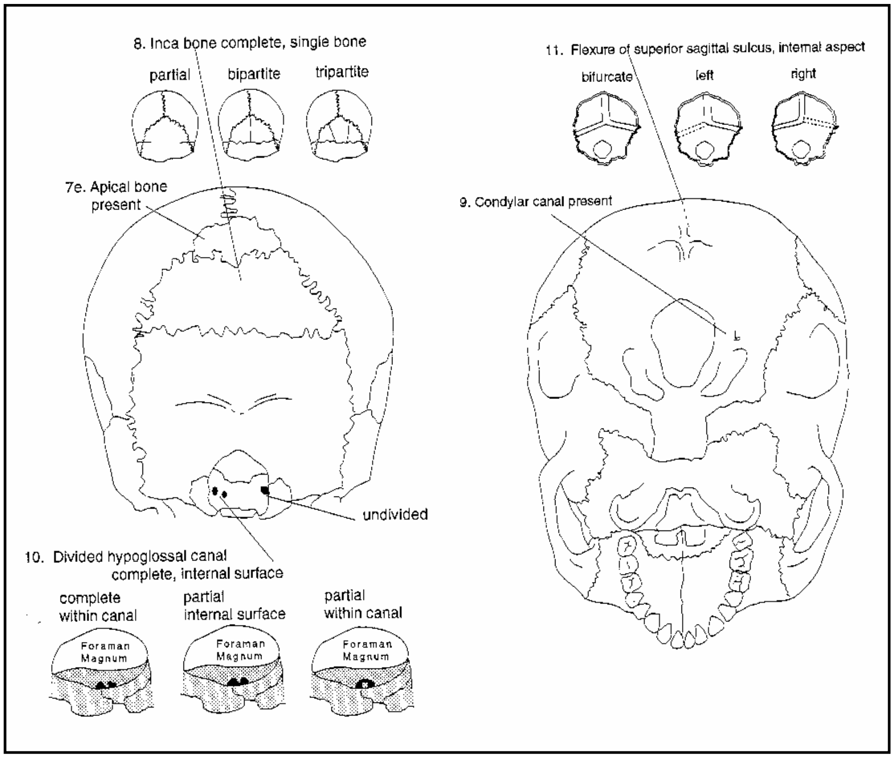


FIGURE 9-15: Location of Nonmetric Traits in the Human Skull, Numbers 8 thru 11(Buikstra and Ubelaker 1994)

12. Foramen Ovale Incomplete: Foramen ovale (sphenoid bone) open to foramen lacerum (Figure 9-16).

13. Foramen Spinosum Incomplete: Foramen spinosum (sphenoid bone) open to foramen lacerum (see Figure 9-16).

14. Pterygo-spinous Bridge or Spur: Bony bridge due to fusion of lateral lamina between lateral pterygoid plate of sphenoid and spina angularis (see Figure 9-16).

15. Pterygo-alar Bridge or Spur: Bony bridge due to fusion of lateral lamina between lateral pterygoid plate of sphenoid and inferior surface of the greater wing (see Figure 9-16).

16. Tympanic Dihiscence: Incomplete closure of tympanic plate of the temporal bone. The defect occurs on the anterior aspect, posterior to the mandibular fossa (see Figure 9-16).

17. Auditory Exostosis (Torus): Bony nodule developed within internal auditory meatus (Figure 9-17).

18. Mastoid Foramen: Foramen located posterior to the mastoid process, usually on the temporal bone, but occasionally on the occipital or within the occipito-mastoid suture (see Figure 9-17).

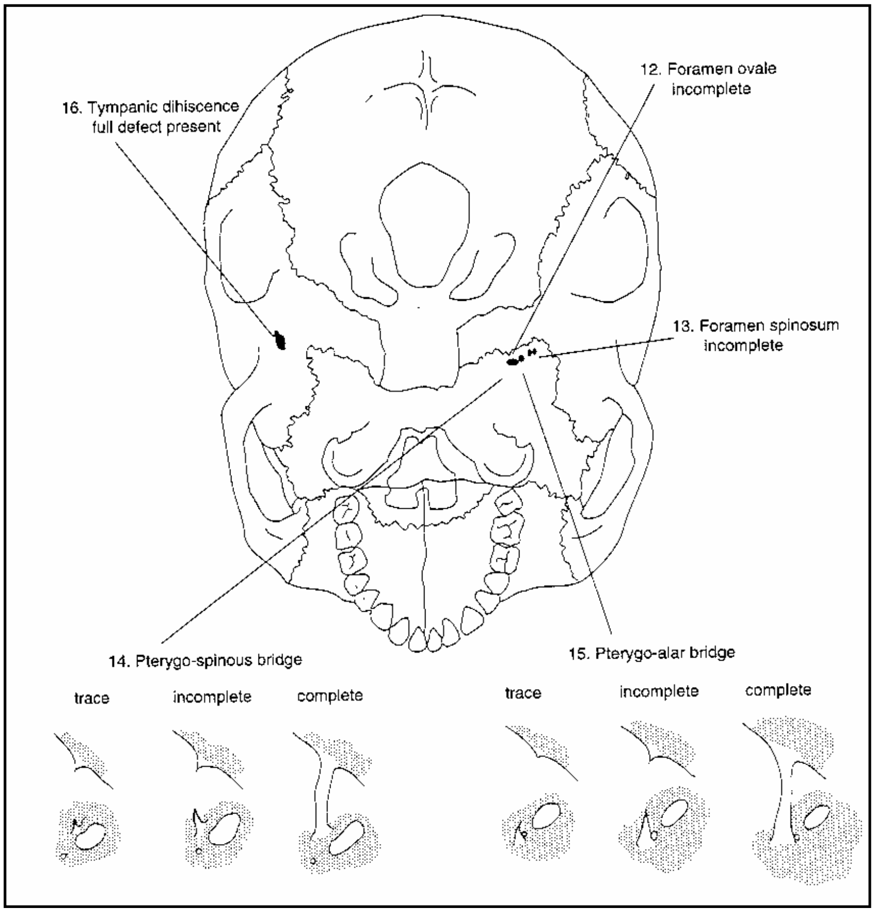


FIGURE 9-16: Location of Nonmetric Traits in the Human Skull, Numbers 12 thru 16 (Buikstra and Ubelaker 1994:90)

19. Mental Foramen Number: Foramina located on the external aspect of the mandibular corpus inferior to P3 (see Figure 9-17).

20. Mandibular Torus: Bony ridge or series of nodules that develop on the lingual aspect of the lower jaw near the premolars and canines (see Figure 9-17).

21. Mylohyoid Bridge: Bony bridge over the mylohyoid canal of the mandible, either in the region of the mandibular foramen or approximately in the center of the groove (see Figure 9-17).

22. Atlas Bridging: The location and degree of expressions are scored (Figure 9-18).
    Lateral Bridge: Bony spicules unite the lateral aspect of the superior articular facet of C1 with the lateral mass.
    Posterior Bridge: Bony spicules unite the posterior aspect of the superior articular facet of C1 with the posterior arch.

23. Accessory Transverse Foramina in Seventh Cervical Vertebra: Bony spicules may divide transverse foramina (see Figure 9-18).

24. Septal Aperture: Perforation between the olecranon fossa and coronoid fossa of the distal humerus (see Figure 9-18).

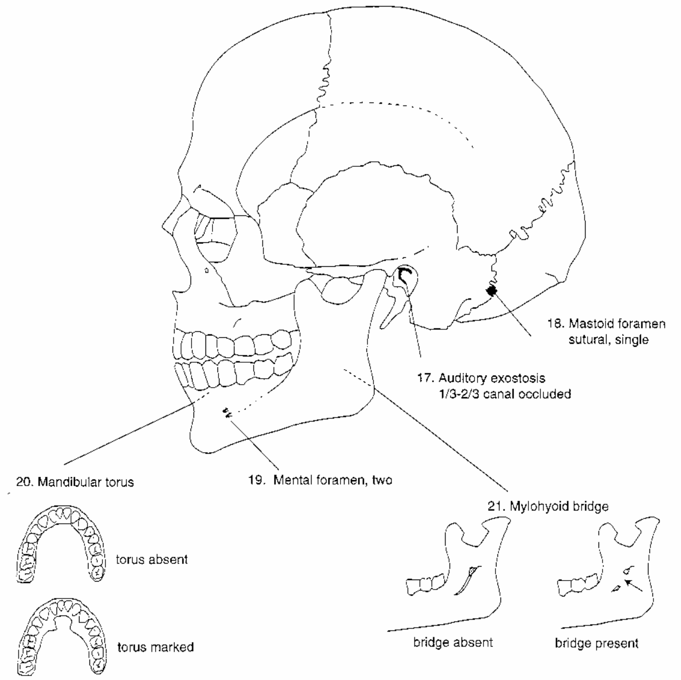


Figure 62. Lateral aspect of cranial vault illustrating locations of auditory exostosis, mastoid foramen, mental foramen, mandibular torus, and mylohyoid bridge.

FIGURE 9-17: Location of Nonmetric Traits in the Human Skull, Numbers 17 thru 21 (Buikstra and Ubelaker 1994:91)

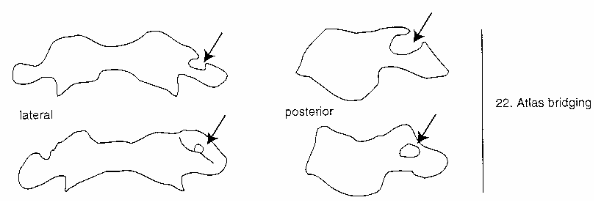


Figure 63. Lateral and posterior bridging of the atlas. Both partial (top) and complete (bottom) bridging are illustrated (after Hauser and DeStefano 1989, Figure 17).

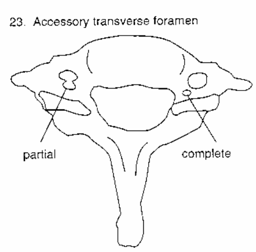


Figure 64. Accessory transverse foramen in the seventh cervical vertebra, illustrating complete (right) and partial (left) expressions (after Saunders 1978, Plate 35).

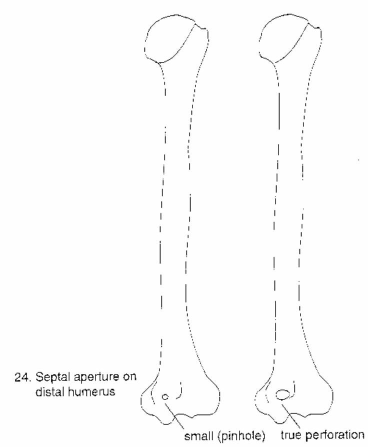


Figure 65. Two degrees of expression of the septal aperture (after Saunders 1978, Plate 8f).

FIGURE 9-18: Location of Non-Metric Post-Cranial Traits, Numbers 22 thru 24 (Buikstra and Ubelaker 1994)

C. ANALYTICAL APPROACH

The analysis of the Potter's Field burial population utilized traditional approaches for the assessment of the general physical characteristics of individuals age at death, gender, and stature (see Buikstra and Ubelaker 1994; Stewart 1979; Brothwell 1981; Bass 1987; Iscan and Kennedy 1989). Skeletal remains were examined and assessed for eight descriptive study categories where completeness permitted, using standard osteological procedures. The study categories included: (1) a general description, count, assessment of preservation and completeness, and recordation of the osteometrics of the osteological material, (2) estimation and identification of the minimum number of individuals (MNI), (3) determination of gender, (4) estimation of age, (5) estimation of stature, (6) skeletal attributes of race, (7) recordation of non-metric observations, and (8) description of all pathologies observed. Throughout the analytical phase, no destructive analysis was undertaken and each set of human remains were handled with the utmost care and respect.

D. SKELETAL ELEMENT INVENTORY

As part of the general description of skeletal material, the elements of the human remains were identified, analyzed, inventoried, and photographed when warranted. Observations were made on condition and preservation. In addition, evidence of post mortem damages and pathologies were noted. The following sections of this chapter characterize the Potter's Field burial population and provides the results of the sample population analysis.

E. PRESERVATION AND COMPLETENESS

The state of preservation is a judgmental analytical category based on the condition of the osteological remains. Numerous factors can affect the condition and decomposition of skeletal elements. Interment time, soil composition, moisture, temperature (freeze-thaw cycle), and disturbance (faunal, botanical, and man-made impacts), all contribute to the preservation and completeness of recovered human remains. In the case of Potter's Field, all of these factors played a significant role. Preservation of remains at Potter's Field varied from no identifiable remains except a single tiny bone splinter or tooth fragment in an extremely poor state of preservation and completeness; to fetal remains with soft tissue preserved in a jar of formaldehyde in an excellent state of preservation and completeness (Plates 9-1 and 9-2), to intact and articulated skeletal remains in an excellent to good state of preservation and completeness (Plates 9-3 and 9-4).

PLATE 9-1: Fetal Remains Exhibiting Excellent Soft Tissue Preservation (Burial No. 10,011)

PLATE 9-2: Fetal Remains in Jar

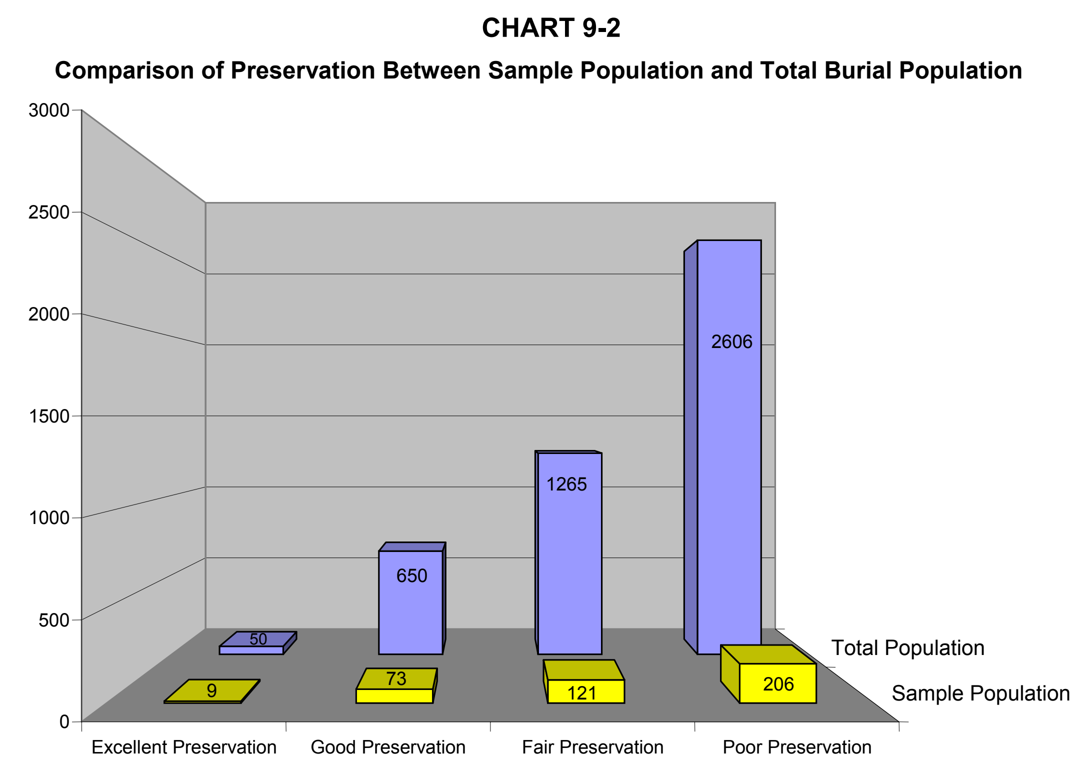
PLATE 9-3: Excellent State of Skeletal Preservation and Completeness (Burial No. 674 A)

PLATE 9-4: Coffin Containing Well Preserved Skeleton (Burial No. 655 B)

A very small number of burials contained soft tissue deposits (N=105 or 2 percent of the total burial population). The archaeologists who were tasked with the recovery of these burial deposits, especially those that might contain soft tissue materials, attended health and safety briefings on how to recover and treat soft tissue remains. In addition to health and safety requirements and procedures, camphor and Vicks were utilized by the archaeologist to help mask any odors associated with these decomposing remains.

Preservation statistics for the entire Potter's Field burial population indicate that 57 percent (N=2,606) of the remains were discovered in a poor state of preservation, 28 percent (N=1,265) were in a fair state of preservation, 14 percent (N=650) were in a good state of preservation, and only one percent (N=50) were considered to exhibit an excellent state of preservation. The preservation condition of the sample population that was selected for more extensive osteological examination included 206 sets of remains that were recovered in a poor state of preservation, 121 exhibiting a fair state of preservation, 73 characterized in a good state of preservation, and 9 sets of remains in an excellent state of preservation. As illustrated in Chart 9-2, the four general preservation categories were fairly well represented in the selected sample population ranging between 8 and 18 percent for each of the categories.

The determination of skeletal completeness was based on the percentage of bones recovered from the human burial deposit. There are 206 bones in the human body. The number of bones recovered from a burial directly reflects its percentage of completeness, and thus, its ability to accurately represent the deceased's full range of pathologies and skeletal characteristics. With respect to the Potter's Field project, when fewer than 51.5 bones were recovered from a particular interment, that burial was scored as being



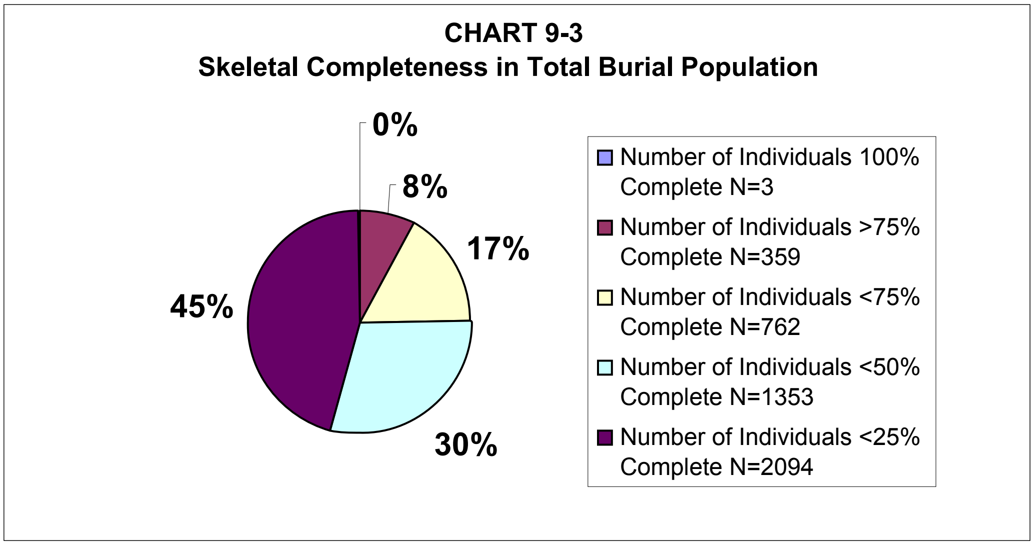
less than 25 percent complete. If less than 103 bones were recovered then the burial was considered to be less than 50 percent complete. When less than 154.5 bones were recovered the burial was characterized as less than 75 percent complete, while 100 percent complete indicated that all 206 bones were recovered – as would be typical in an enclosed coffin.

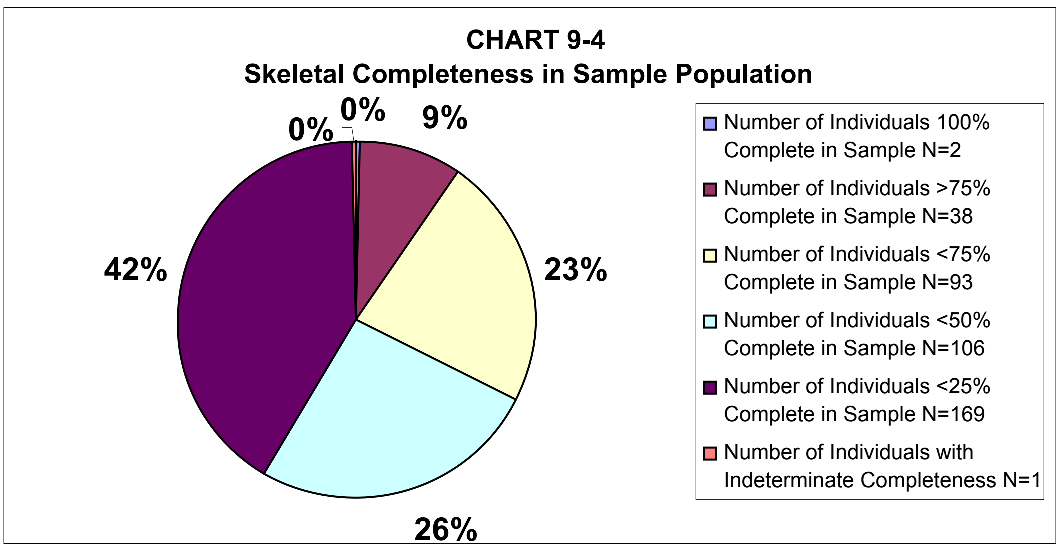
In an effort to avoid confusion and misinterpretation, a category labeled "Parts" was added to the completeness category because the burial register indicated that amputated limbs were on occasion afforded separate interment. An intentionally buried amputated leg could be considered 100 percent complete however, recording a 100 percent complete statement would have been misleading when only a part of a body was buried. Thus, the "Parts" category was created to list separately any skeletal elements that were intentionally buried at Potter's Field and recorded in the burial register.

Review of the statistics for skeletal completeness in the Potter's Field burial population indicate that 45 percent (N=2,094) were less than 25 percent complete, 30 percent (N=1,353) were less than 50 percent complete, 17 percent (n=762) were less than 75 percent complete, while only eight percent (N=359) were greater than 75 percent complete, and less than one percent (N=3) were considered 100 percent complete (Chart 9-3). The three sets of remains that exhibited 100 percent skeletal completeness included the fetus preserved and buried in a jar of formaldehyde, the individual interred in the metal Ziegler Box, and a male less than 50 years of age in an hexagonal wooden coffin (Burial No. 654 B).

Chart 9-4 graphically depicts the skeletal completeness for the osteological sample population. A total of 42 percent (N=169) of the skeletons were less than 25 percent complete; while 26 percent (N=106) of the interments were less than 50 percent complete; 23 percent (N=93) of the individuals were less than 75 percent complete; while nine percent (N=38) of the burials were greater than 75 percent complete; and less than one percent (N=2) of the individuals in the sample were considered 100 percent complete.

Comparison of Charts 9-3 and 9-4 indicate that the majority of Potter's Field burials were less than 50 percent complete with respect to skeletal elements and that, in general, less than 103 bones of an individual were recovered from the grave shaft.





F. MINIMUM NUMBER OF INDIVIDUALS

By definition, the minimum number of individuals or MNI refers to the minimum number of individuals necessary to account for all of the skeletal elements recovered from a single grave shaft or burial deposit. As part of this phase of the analysis, the skeletal remains are separated into discrete individuals based on the duplication of diagnostic bones. However, in order to provide the most accurate interpretations of commingled remains within grave shafts or burial deposits, the determination of MNI also included the assessment of the skeletal element, side, age, gender, occlusion, articulation, and antimeric partners (cf., White 2000). For example, if a single grave shaft or burial deposit contained two left adult male femurs then the resulting MNI for the grave shaft would be estimated at two.

At Potter's Field, the estimations and identifications of MNI was one of the most critical pieces of physical evidence. Based on the review of the burial registers for the Hudson County Burial Ground, during the first twenty years of operation most of the interred were buried in individual grave shafts. However, the trend toward multiple use of a single grave occurred after 1903 with two or three individuals sharing the same grave shaft. In addition, during the last five years of interments the burial register indicates that numerous burial shafts contained four or five individuals. As such, the Berger team was prepared for the possibility that several individuals would be commingled within a grave shaft.

The determination of MNI was essential from both an administrative and scientific perspective. As it was uncertain exactly how many individuals were buried within Potter's Field the estimation of MNI allowed for an accurate total count of disinterred remains associated with the project. In addition, the total number of individuals represented by the remains was required for the disinterment/reinterment permits authorized by the state health department, mortician, and receiving cemetery at the conclusion of the project. The cumulative results of the MNI determinations or total Potter's Field burial population also was utilized to assess and justify time and cost expenditures associated with the project. With regard to the scientific research objectives of the project, the MNI in combination with the estimation of gender and age allowed the Berger team to establish patterns or correlations with the burial register and historic maps of the burial ground. The more pattern correlates achieved with the burial register and historic maps, the greater likelihood that individuals within shafts could be assigned identities (i.e., names). Finally, the estimates of MNI also were essential during the field effort when clusters of skeletal elements were discovered both under the Turnpike bridge and in the area of the Turnpike's 1950 reinterment plot

Excavations at Potter's Field revealed that oftentimes multiple individuals in a shaft would be commingled, although two individual interments per shaft was the most common occurrence (Plates 9-5 thru 9-7). During the osteological analysis, the minimum number in individuals (MNI) was calculated for each burial deposit, and the skeletal material was separated into discrete individuals if more than one individual was represented. Determination of discrete individuals was based on the morphology of diagnostic bones. When it was possible to positively identify which element belonged to which individual, they were boxed separately. The osteological elements were counted to determine the minimum number of individuals in each shaft and/or burial deposit (MNI). When the burials were commingled, the individual skeletons were boxed separately as could best be determined and the boxes of both individuals were taped together so that they would remain together during re-interment as well.

PLATE 9-5: Commingled Remains of Two Individuals (Burial No. 697 B/C)

PLATE 9-6: Commingled Remains of Two Individuals Laying Side by Side (Burial No. 687 A/B)

PLATE 9-7: Commingled Remains of Two Individuals (Burial No. 11,170 A/B)

During June 2003, Berger's field team discovered a dense, elliptical concentration of skeletal material measuring approximately 2x3-meters under one of the bays of the Turnpike's bridge in the southern portion of the project area. Designated Cluster No. 1, this deposit consisted of hundreds of disarticulated but generally well-preserved bones, representing mostly long bones, skulls, and pelvises (Plates 9-8 and 9-9). The exhumation of remains within the cluster was organized by calculating the MNI of the entire deposit. Using the left femur as the referent skeletal element and observed portions of two child's crania, a minimum of 65 individuals was enumerated from the cluster assemblage. Each left femur (N=63) and the children's crania (N=2) were assigned a unique identification number and alpha beginning with burial number 20,001 to distinguish these remains from shaft burials. Due to the absence of any articulation between skeletal elements, the remainder of the cluster was boxed by bone type and assigned an overall 20,000-series identifier.

PLATE 9-8: Cluster No. 1 Disarticulated Skulls and Long Bones

PLATE 9-9: Cluster No. 1

A second area containing a mix of skeletal elements and burial deposits was identified upon demolition and removal of the southern and eastern wings of Building B. Soil stripping revealed a surprising number of intact shafts beneath the building, preserved largely by the construction technique of elevating the floors on concrete pilings. Distinct among the rows of shafts exposed under the southern wing was a rectangular area devoid of any shafts, yet which contained discrete groups of human skeletal remains. Sets of remains took the form of bone bundles rather than the standard arrangement of extended or flexed positions that typically were found at Potter's Field. Exposed skeletal elements tended to be large, dense bones, particularly skulls and long bones (Plate 9-10). Coffin wood was not evidence, and in contrast to single shaft burials, these bundles often contained elements of multiple individuals. After exposing the bundles it was clear that these remains were located within a trench. Trench exhumations were performed by generating an MNI count of skeletal elements. Using the cranium as the referent, 43 individuals were tallied within the trench. Each of these bundle burials was assigned a unique identification number and alpha starting with burial number 25,001. Utilizing discrete series to identify the bundle burials enabled later analyses to more easily differentiate these individuals from shaft burials. Field and osteological investigations determined that this second mass burial area was the result of an earlier, and documented, burial disinterment and re-interment undertaken by the Turnpike during the 1950's.

PLATE 9-10: Turnpike's 1950 Reinterment Plot Containing Bundle Burials

G. GENDER DETERMINATION

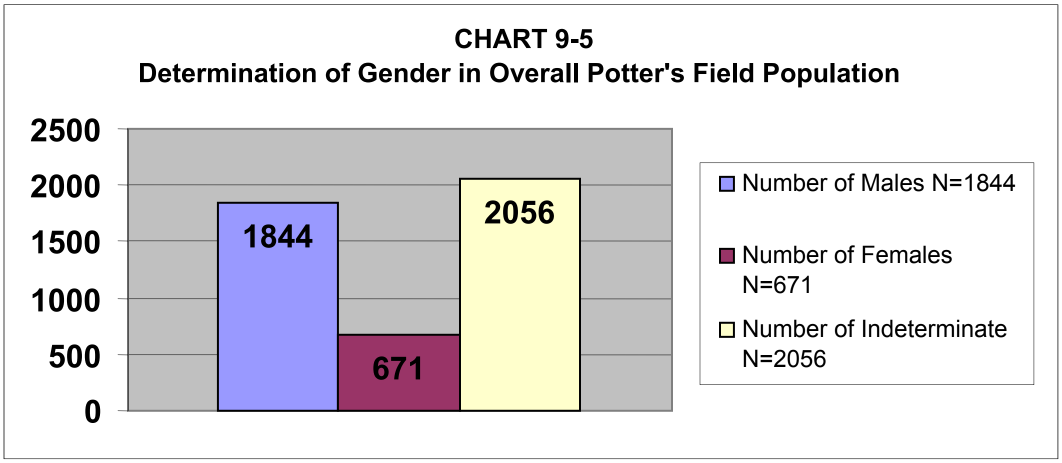
Determination of gender (or the sex of the individual) is based on direct observation of sexually dimorphic criteria. Adult males and females differ in size and morphological characteristics, and this variation is reflected in the skeletal material. Determining the gender of juveniles is more problematic as distinct male/female traits are generally more age dependent.

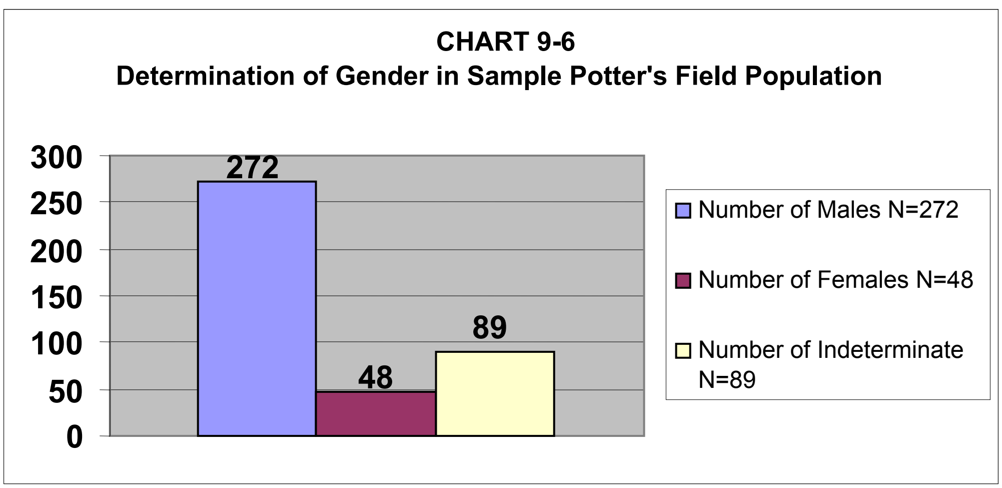
Morphological traits that assist in determining the gender of an individual have the strongest signatures in the crania (skull) and pelvic region. Landmarks in the skull that are diagnostic of gender include the supra-orbital ridges and margins, frontal bone, mastoid processes, occipital protuberance, nuchal crest, eye orbits, mental eminence, mandible, and gonial angle. Landmarks that identify gender differences in pelvic morphology include the pubic symphysis, auricular surface, subpubic angle, obturator foramen, acetabulum, greater sciatic notch (Plates 9-11 and 9-12), ischiopubic ramus, and preauricular sulcus. Further, the diameter of the femoral head, the diameter of the humerus head, the size of the glenoid cavity, and the length of the zygomatic process are additional morphological traits that may assist in determining the gender of an individual.

PLATE 9-11: Male Pelvis with Narrow Sciatic Notch

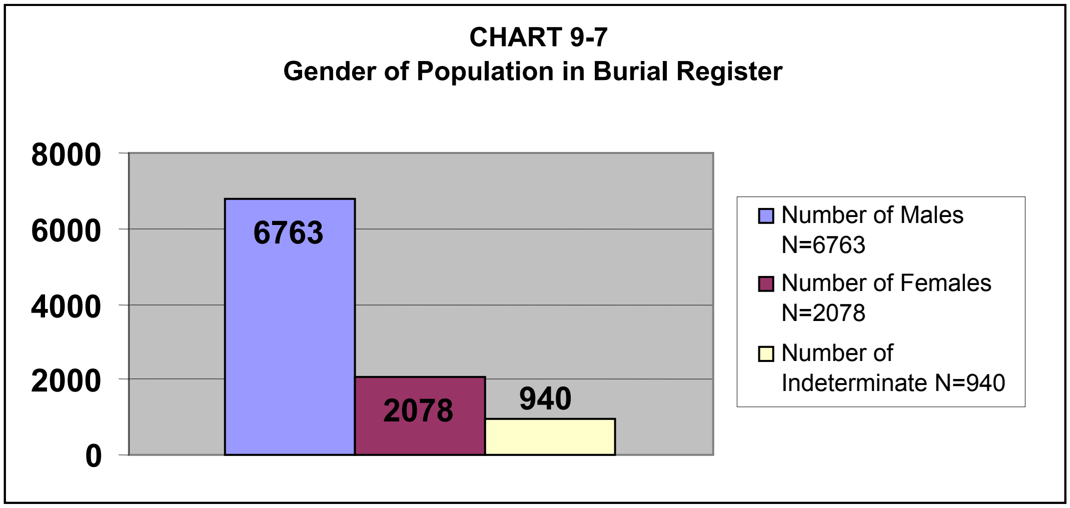
PLATE 9-12: Female Pelvis with Wide Sciatic Notch

The disinterment program at Potter's Field resulted in the recovery of 1,844 males (or 40 percent of the recovered burial population), 671 females (roughly 15 percent of the total burial population), and 2,056 individuals in which the gender was indeterminate (45 percent) (Chart 9-5). The sample population selected for additional, more extensive osteological analysis, contained 272 males (66 percent of the sample population), 48 females (12 percent) and 89 individuals in which the sex was indeterminate (22 percent) (Chart 9-6). Of the 89 individuals in the sample subpopulation where gender could not be determined, 67 (or 74 percent of the indeterminate group) were children. Sexually diamorphic traits are not fully developed in children making a determination of gender in children frequently highly problematic.





While the Hudson County burial register accounts for 9,781 individuals (over twice the number disinterred at Potter's Field indicating that more than 5,200 burials may be associated with the other two burial grounds operated by Hudson County), this set of historic records allows for gender comparisons between the recovered population and the historically documented burial population. There were 6,763 males (or 69 percent of the burial population) listed historically as being interred in one of the three Hudson County burial grounds, plus 2,078 females (21 percent), and 940 individuals (approximately 10 percent) for which the gender of the individual was not recorded (Chart 9-7). Comparison of the historically documented material to the data recovered during the excavations at Potter's Field, one finds that there is not significant variability between the percentages of males and females in the current excavated burial population when compared to the historic documentation. It is both interesting to note and not unexpected that males dominated both the historically documented and disinterred burial populations.



H. ESTIMATION OF AGE AT DEATH

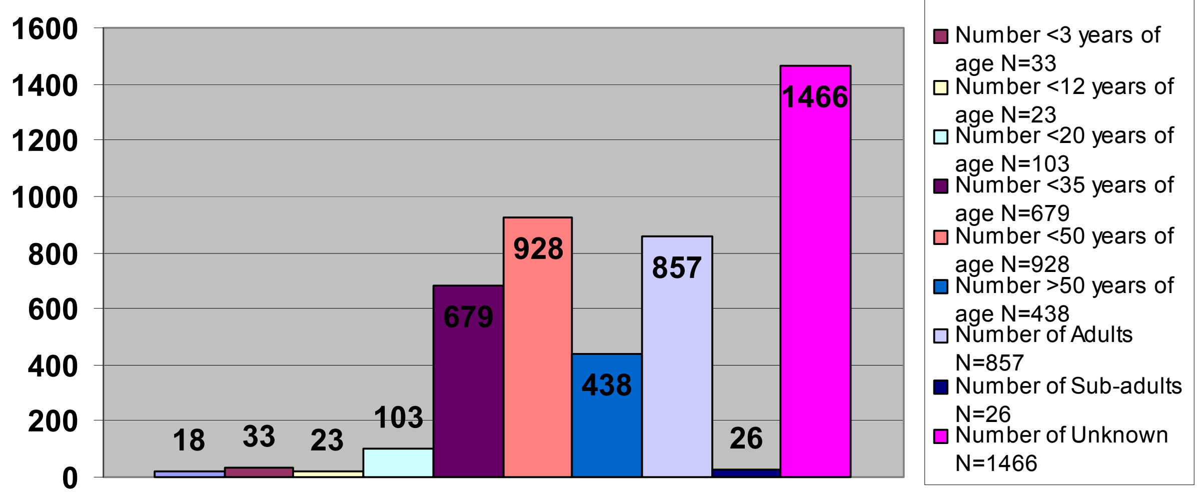
The determination of age relies on an assessment of physiological age, as opposed to the chronological age of the individual (cf., Iscan and Kennedy1989:8). The physiological age is based upon relative growth patterns of the skeleton. Theoretically, this measure is expected to give an accurate estimate of chronological age, but environmental, nutritional, and disease stresses often cause changes in the skeleton which will mask the true age of the individual (cf., Gray 1964).

The accuracy with which age can be estimated varies inversely with the age of the individual (Stewart 1979:128). In a subadult, age estimation is based primarily upon observed developmental changes. These growth markers generally occur at certain ages in one's life and thus, more precise estimates are possible (Saunders 1992). After the age of 25 to 30 years, age estimates are more often accomplished through the observation of degenerative changes, with less accuracy in the age estimation resulting (Kerley 1970).

A holistic approach that considers all possible age-related attributes is best for an overall age of individual estimate. Attributes utilized in this analysis include (1) dental eruption and occlusion, (2) cranial suture closures, (3) postcranial epiphyseal unions, (4) pubic symphyseal face morphology; (5) auricular surface morphology; (6) phase changes in the sternal rib, and (7) age-related degenerative conditions.

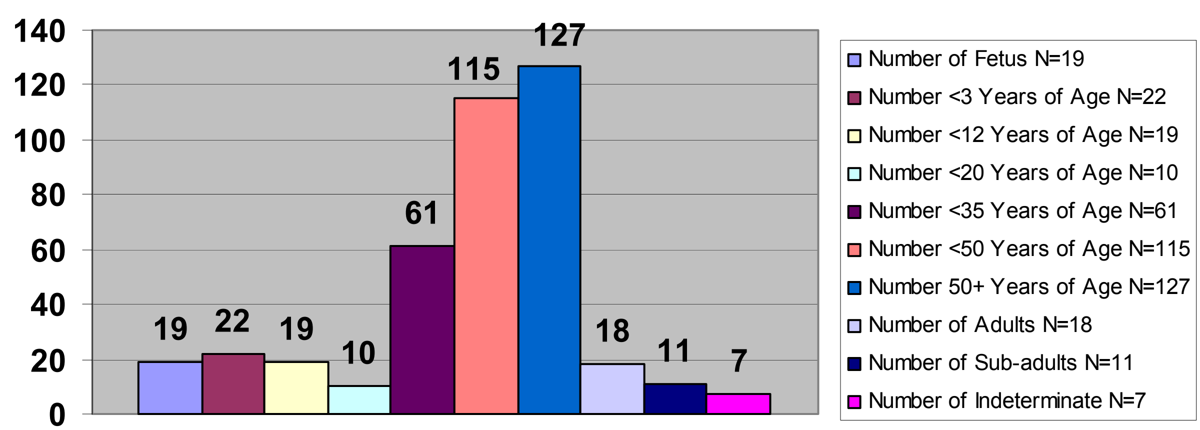
The graphs below illustrate the age at death for the total Potter's Field burial population versus the osteological sample population (Chart 9-8). The age at death in the overall population indicates that there were 18 fetal remains (0.3 percent of the total burial population), 33 individuals were less than three years of age (0.7 percent), 23 individuals were less than 12 years of age (0.5 percent), 103 of the burials were less than 20 years old (2 percent), 679 of the burials were less than 35 years old (15 percent), 928 of the individuals were less than 50 years old (20 percent), and 438 of the individuals were greater than 50 years old (10 percent). There were 1,466 burials that were so deteriorated than the age at death could not be determined (32 percent of the total population). Further, the preservation of some of the burials prohibited a specific age determination and could only be identified as subadult versus adult. There were 26 subadult individuals (0.5 percent) and 857 adult individuals (19 percent) in this final age group.

CHART 9-8
Age Distribution in Total Burial Population



The osteological sample population was assessed for age and revealed that there were 19 fetus (four percent), 22 individuals less than three years old (five percent), 19 burials less than 12 years old (four percent), 10 were less than 20 years old (two percent), 61 individuals were less than 35 years old (14 percent), 115 of the remains were less than 50 years old (28 percent), and 127 individuals were greater than 50 years old (31 percent) (Chart 9-9). The remaining individuals (N=36) were in such poor condition that only the broad categories of subadult, adult, and indeterminate could be determined. Eleven of these individuals were assigned to the subadult category (two percent of the sample population), while 18 burials were placed in the adult category (four percent). The remaining seven individuals were indeterminate as to age (one percent of the sample population).

CHART 9-9
Age Distribution in Sample Burial Population



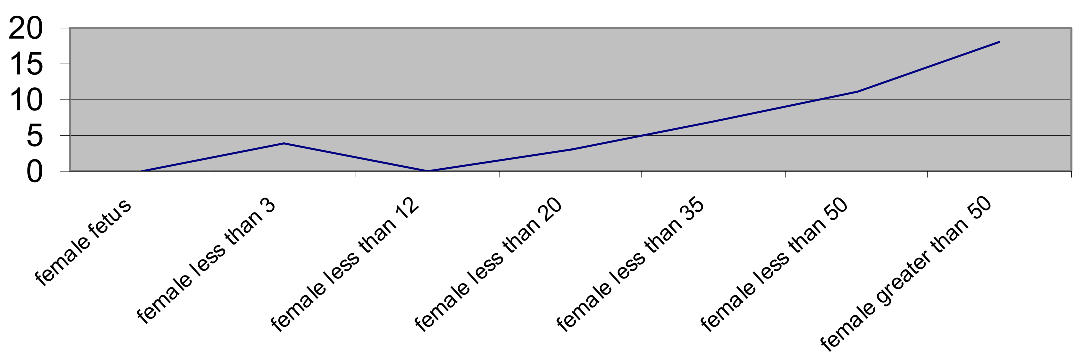
When compared to historic death rates, it was observed that there were a proportionately low number of children in this burial population for this historic time period. This is not surprising when one considers the source of this burial population. Intuitively, during the formative years of the burial grounds operation, the County penitentiary would have been devoid of children, the contagious disease hospital would have had a small number of children, and the mental health hospital may also have had a small number of children. The almshouse would be the logical source for the majority of children recovered in this burial population. In fact, the burial register indicates that 63 percent of the infant burials at Potter's Field originated in the almshouse.

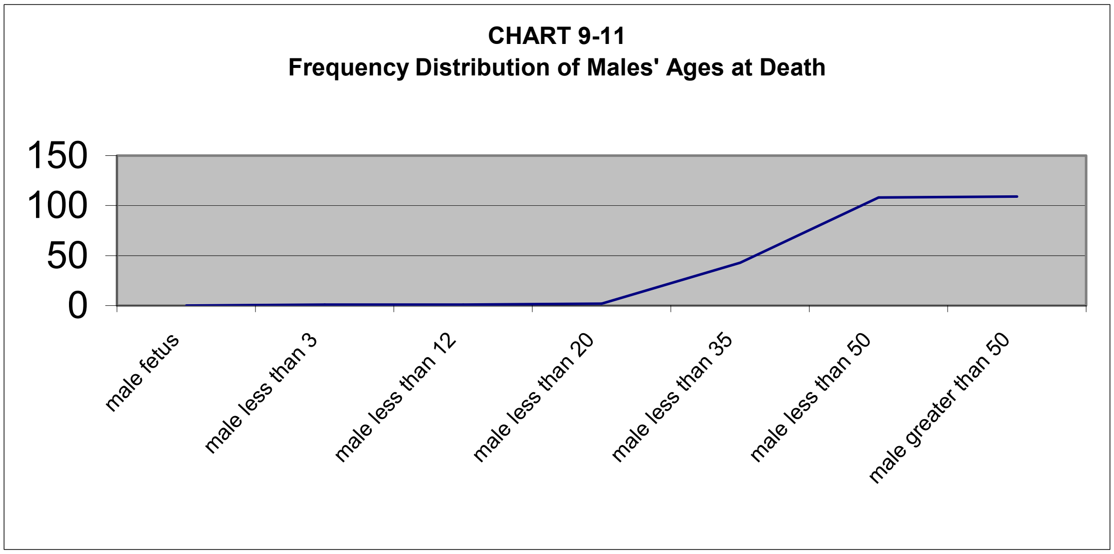
It is noted that there is a marked difference between the two graphs in the number of individuals over the age of fifty that are represented. This is most probably due to poor preservation of this subset of the skeletal population, and the ability of the osteologist to identify and age the degenerative conditions of old age with this poor preserved material.

The average age of death by gender was calculated in the sample population. Specific ages were recorded in the osteological sample whereas general age groups were recorded for the total Potter's Field burial population during the data recovery process. The average age of death for females in the sample population was 42.5 years. The youngest female was two hours old (as indicated by the burial register entry) and the oldest female was 82 years old. Coincidentally, the average age of death for males was also 42.5 years. The youngest male was one month old (as indicated by the burial register) and the oldest male was 79 years of age. As a point of reference, the average life expectancy in 1900 was 47.3 years of age as compared to the current average life expectancy in New Jersey of 77.6 years.

The female versus male age at death graphs depict significant variability between the two genders (Charts 9-10 and 9-11). The female graph depicts a continuous progression or rate of death as age increases. The male graph depicts a sharp increase in death between the ages of 20 and 50 and then a leveling off or constant rate of death after the age of 50.

CHART 9-10
Frequency Distribution of Females Ages at Death





I. HEALTH AND DISEASE OF POTTER'S FIELD BURIAL POPULATION

In general, detailed Public Health records were kept beginning circa 1900, although health and disease has been documented throughout history. There have been remarkable achievements in disease control and modern medicine during the last century, and deaths from infectious diseases have decreased. Infant and child mortality has dropped and the average life expectancy has increased by 29.2 years (www.cdc.gov). In 1900, 30.4 percent of all deaths were children younger than five years. The three leading causes of death in 1900 were pneumonia, tuberculosis, and diarrhea (including enteritis and diphtheria). These three maladies caused one third of all deaths in all age groups, with 40 percent of those being children under the age of five years.

The New Jersey Department of Health and Senior Services has compiled a great deal of data to compare the health conditions between the Year 1900 and the Year 2000. In 1900, there were 32,270 births recorded in New Jersey with a birth rate calculated at 17.1 per 1,000 people. There were 115,542 births in the Year 2000, and the birth rate was 13.7 per 1,000 people.

Age at death has changed drastically in the last century – largely due to improved medical treatment (Chart 9-12). In 1900, only 25 percent of the population lived to 60 years of age. In the Year 2000, 83 percent of the population lives beyond 60 years of age. In 1900, one-third of the children died before the age of five, while in 2000 only one percent of the children less than five years die. The New Jersey Department of Health compared the deaths of males versus females between 1900 and 2000. In 1900, the death rate for males was 15.7 percent higher than females. By 2000, the death rate for males was 44.5 percent higher that females.

During the mid to late nineteenth century, industrialization and immigration led to overcrowding and in turn inadequate water supplies and waste disposal systems. These unsanitary conditions led to the repeated outbreak of diseases such as cholera, dysentery, tuberculosis, typhoid, influenza, yellow fever, and malaria.

A comparison of the leading causes of death in New Jersey between 1900 and 2000 is presented in Table 9-1. It is interesting to note how the cause of death has shifted and changed over the last decade. The differences in part are due to the advent of the containment of contagious diseases due to antibiotics and advances in medicine and diagnosis.

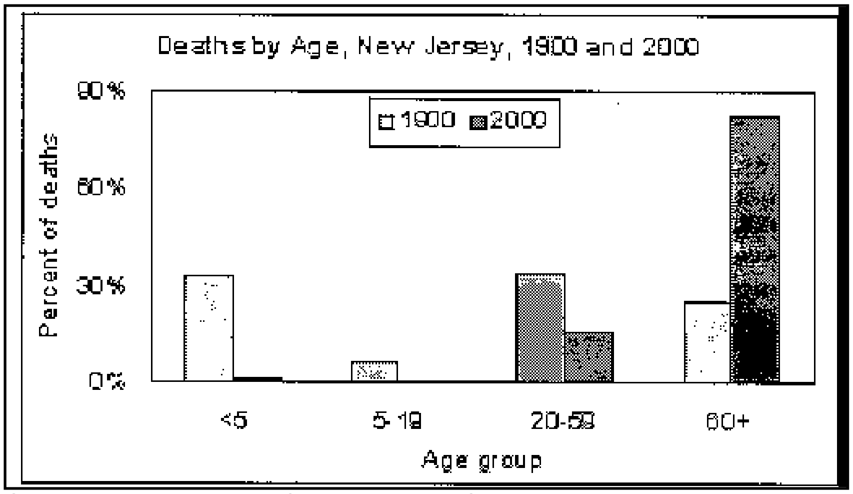


CHART 9-12: Histogram of Deaths by Age Comparing the Years 1900 and 2000 (from the New Jersey Department of Health and Senior Services)

TABLE 9-1

LEADING CAUSES OF DEATH, NEW JERSEY, 1900 AND 2000

RANK	1900			2000		
	Cause of Death	*Number*	*Crude Rate*	*Cause of Death*	*Number*	*Crude Rate*
1	Acute lung diseases	4,795	254.6	Diseases of the heart	23,724	281.9
2	Consumption	3,514	186.6	Malignant neoplasms	18,073	214.8
3	Diarrheal diseases of children	3,010	159.8	Cerebrovascular diseases	4,316	51.3
4	Adult brain and spinal diseases	2,946	156.4	Chronic lower respiratory diseases	3,007	35.7
5	Diseases of heart and circulation	2,852	151.4	Diabetes mellitus	2,483	29.5
6	Deaths under one month of age	2,252	119.6	Unintentional injuries	2,284	27.1
7	Contagious diseases other than consumption	2,240	118.9	Influenza and pneumonia	2,044	24.3
8	Renal and cystic diseases	2,073	110.1	Septicemia	1,744	20.7
9	Brain and nervous diseases of children	1,767	93.8	Nephritis, nephrotic syndrome, and nephrosis	1,495	17.8
10	Violent deaths	1,712	90.9	Alzheimer's disease	1,267	15.1
11	Digestive and intestinal diseases	1,700	90.2	HIV disease	830	9.9
12	Cancer	921	48.9	Chronic liver disease and cirrhosis	765	9.1
13	Puerperal	288	15.3	Pneumonia due to solids and liquids	574	6.8
14	Acute rheumatism	73	3.9	Suicide	560	6.7
	Residual	1,331	70.7	Residual	11,634	138.3
	Total	31,474	1,670.9	Total	74,800	889.0

Crude rates are computed per 100,000 population.

Tuberculosis can be traced back to at least 5,000 BC. Tuberculosis has been called by numerous names over the years, including "the White Plague", "Phthisis" (Greek – meaning "to waste away"), scrofula (characterized by the swelling of the lymph nodes in the neck), consumption (the wasting away of the body), and "TB" (the presence of "*tubercle bacillus*"). In 1812, 697 out of every 100,000 people died of tuberculosis in New York City. Crowded living conditions and unsanitary factories facilitated the spread of tubercle bacillus, the germ that caused the disease. In general, TB patients suffered from swollen lungs, weight loss, and fatigue. In the end of the nineteenth century, legislators clamped down on spitting on sidewalks and in other public areas as a preventative measure. New York City passed the Tenement Housing Law of 1901 that required housing to be more sanitary. As a result, TB has declined significantly from these early figures, especially since 1953, primarily due to modern medicine and better preventive public health measures.

A law requiring the notification of dangerous communicable diseases was passed in 1895 that, among other things, required the isolation of individuals with contagious diseases. The occurrence of these major communicable diseases began to decline by 1900 due to such measures and medical improvements. By 1900, 40 of the then 45 states established health departments. The first county health departments were established by 1908. Drinking water began to be chlorinated in the early 1900's, in an effort to decrease the incidence of waterborne diseases. Improvement in housing conditions, reduced overcrowding, and tuberculosis–control programs reduced the incidence of TB. By 1900, only 194 of every 100,000 people in the United States died from TB. The majority of those who died lived in urban areas. For example, in 1918, 4,987 people died in Manhattan from tuberculosis. Indeed, TB remained a leading cause of death up until 1940 (before antibiotic therapy was developed).

From 1918 to 1919 there was a devastating influenza epidemic that left 20 million dead worldwide. This flu was also known as the Spanish Flu or "La Grippe". In the United States, 500,000 died in less than one year. The flu was unusual in that it was most deadly to people 20 to 40 years old. Flu typically is a killer of the elderly and young children. Infectious diseases began to be controlled in the late nineteenth century when the microorganisms that cause some diseases were discovered. However, most disease control was a direct result of improved sanitation and hygiene, coupled with the creation of antibiotics and childhood vaccinations.

Vaccination programs begun the mid-1900's – especially during and immediately after the Second World War – have virtually eliminated many diseases that were common in the United States. Specifically, diseases such as diphtheruia, tetanus, poliomyelitis, smallpox, measles, mumps, rubella, and Haemophilus influenzae Type B meningitis have been greatly reduced and controlled. In 1962, a federal vaccination program was established through the Vaccination Assistance Act which further significantly reduced and controlled infectious diseases.

During the 1940s, Penicillin was developed for medical use which provided a quick and complete treatment of previously incurable bacterial illnesses. In addition, serologic testing which is used to diagnose many infectious diseases such as syphilis and gonorrhea came into use in the 1910's at a time when five to nineteen percent of the men in New York City had syphilitic infections.

J. ESTIMATION OF STATURE

As a rule, individuals increase in height from birth to mid-adulthood and then begin decreasing in height in old age. It must be noted that there is variability in height within (inter) human populations as well as between (intra) populations. It has been determined that height is primarily determined by genetics (slightly over 90 percent) while environmental factors such as diet and climate can influence an individuals height by up to 10 percent (cf., Brothwell 1981).

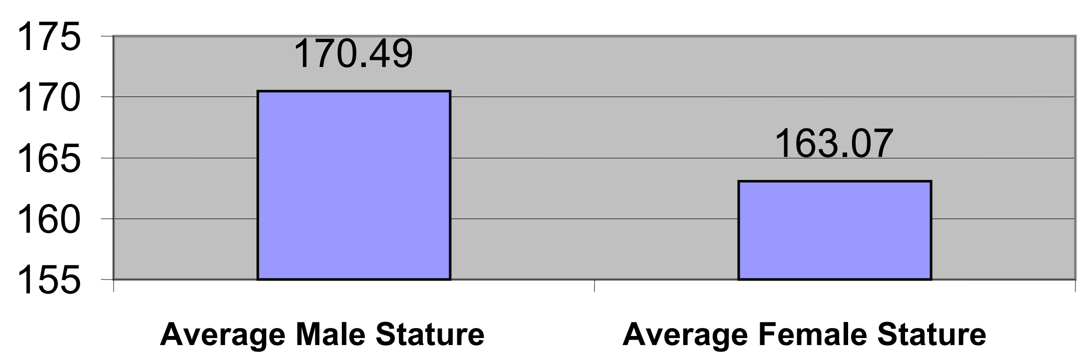
Stature is determined on skeletal remains by measuring the length of the long bones. The bones utilized in this phase of analysis include the humerus, radius, ulna, femur, tibia, and fibula. The bone is placed on an osteometric board for a precise measurement. Measurements are recorded in millimeters.

Estimation of stature is based on extrapolation formulae derived from population averages of long bone lengths. Height estimation averages are compiled from known historic/modern populations, but typically result in some degree of error when applied to prehistoric populations. In adults over 30 years of age the maximum stature should be reduced by 0.06 centimeters to adjust for the projected loss in height. Additionally, the formulae utilized in this analysis takes into consideration the gender and race of the deceased (Trotter 1970).

The National Center for Health Statistics states that in the United States during the Year 2003, the average height for adult males (20+ years of age) was 69.1 inches (5'8"). The average height for adult females in the United States during the same time period was 63.7 inches (5'3"). Thus, there is an average five-inch height difference between adult men and women in the United States.

The average height of the individuals in the osteological sample for Potter's Field was calculated for males and females (Chart 9-13). The average height for males was 170.49 centimeters (5'6") while the average height for females was 163.07 centimeters (5'3"). Males in the osteological sample averaged three inches taller than females.

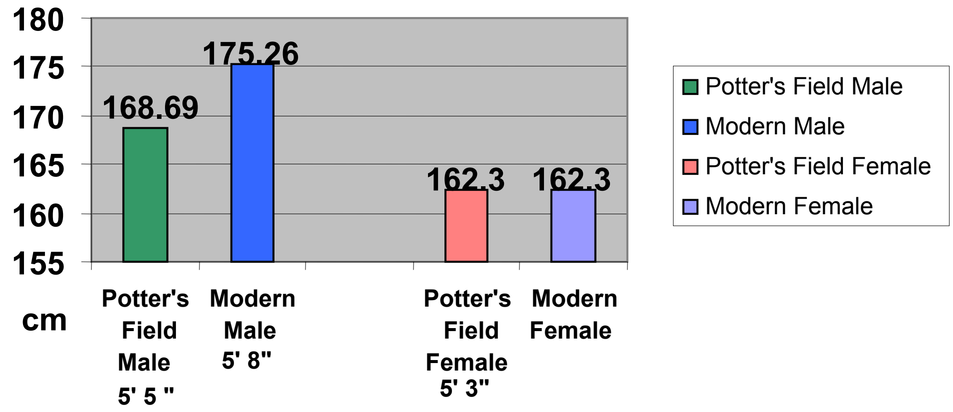
CHART 9-13
Average Male and Female Stature in Sample Population



The average height in the total Potter's Field burial population was calculated, and males displayed an average height of 168.69 centimeters (5'5") while females averaged 162.30 centimeters (5'3") (Chart 9-14). Those individuals of indeterminate sex averaged 166.85 centimeters (5'5"). Males in the total burial population averaged two inches taller than females. The males in the Potter's Field population averaged two to three inches shorter than modern males of today. The females in Potter's Field are similar to today's female average stature. The discrepancy in heights may be due to malnutrition and disease or possibly due to the early immigrant status of this initial burial population that comprised a large portion of the interred. The average height of individuals residing outside of the United States varies.

CHART 9-14

Average Male and Female Stature in Burial Population Versus Modern Population



Wu (1990) suggested that between 1890 and 1945, there was a direct correlation between socio-economic status and height in the Pittsburgh and Allegheny County area. Generally, Wu's study indicated that the higher the socio-economic status of the individual, the greater was their stature or height.

K. SKELETAL ATTRIBUTES OF RACE AND ETHNICITY

The variability of the morphological traits in the skull provides the means with which to identify the race of an individual. Although there is a certain commonality of anatomical and morphological facial traits for all Homo sapiens, other traits are unique to each race (cf., Bass 1987). Modern man is divided into six areas of regional subspecies which have been identified as Mongoloid (East Asian), Caucasoid (White), Negroid (Black or African-American), Australoid (aboriginal Australian, Melanesian), Native American, and Polynesian. The American Indian and East Asians are commonly combined into the Mongoloid subspecies due to close skeletal similarities (Gill 1990).

The surnames of the deceased listed in the historical burial register often suggested the ethnicity of the males and sub-adults. The surname of adult females, however, may or may not reflect heritage due to the common social-religious custom of females assuming their husbands surname at the time of marriage.

Race can be determined osteologically by racial morphological traits. Differences in facial features alone can often differentiate over 75 percent of the population by race (Gill 1990). An abbreviated table of commonly used facial features (Table 9-2) was employed to record such traits whenever observed in the Potter's Field burial population.

The skeletal material from the Potter's Field burial population only had four individuals who were positively identified as African–American or Black (Plate 9-13). None of the skeletal population could be positively identified as Mongoloid, although there were three individuals who displayed shoveling of the incisors which is a diagnostic trait of Mongoloid populations. However, such a trait on its own is insufficient to classify the skeletal remains as being Mongoloid, and thus additional traits must be sought for such a racial determination. In all three cases, no other Mongoloid traits were present; thus, none of

TABLE 9-2

COMMON MORPHOLOGICAL SKELETAL TRAITS AND RACIAL INDICES

TRAIT	CAUCASOID	AFROAMERICAN	MONGOLOID
Nasal Sill	Deep, well marked, sharp	Dull or absent	Variable
Nasal Spine	Large, long	Small	Small
Nasal breadth	Narrow	Wide	Medium
Nasion	Depressed	Little to no depression	Slight depression
Nasal guttering		Present- shape of base of nose has a gutter	
Nasals	Highly arched, steepled	Low, flat	Low, tented
Prognathism	Little to none- pencil should touch nasal spine and chin	Pronounced	Moderate
Nasal overgrowth			Nasal bones project past junction of frontal part of maxilla
Nasal opening	Narrow	Flared	Flared at base
Palatte	Parabolic to elliptic	Hyperbolic	Elliptic
Palatine suture	Jagged and bulging	Arched	Straight
Face shape	Long and narrow	Rounded forehead	Flat moonlike
Zygomatic bone	Small retreating- pencil across nasal aperature fit finger between pencil and zygomatic bone	Vertical zygomatics	Projecting flatter face would knock off pencil
Zygomatic maxillary suture	Curved- straight more often in females	S shaped	Angled
Zygomatic tubercle		Present	Present posterior
Inferior zygomatic projection			Present- dips below lower edge of maxilla
Cranial sutures	Simple	Simple	Complex
Wormian bones and other ossicles			Present
Cranial vault	High	Low	Keeled
Incisors	Blade form	Blade form	Shovel shaped, rotation, edge to edge bite occlusal wear suggests Native American
Dentition	Canine fossae, carabelli's cusp, small crowded, cupping below mandibular incisors	Large molars, molar crenulation	Enamel extension, buchal pits
Orbits	Sloping	Rectangular	Rounded
Chin	Prominent, square, projecting, bilobate	Blunt, retreating, vertical	Blunt, vertical
Mandible lower border	Undulating	Straight	Straight
Ascending ramus	Pinched, vertical, slanted	Pinched, slanted	Wide, vertical
Gonial angle	Straight	Straight	Everted
External auditory meatus	Elliptic	Rounded	Elliptic
Base chord	Long	Long	Short
Base angle	Low	Low	High
Oval window	Visible	Visible	Not visible
Post bregmatic depression	Absent	Present	Absent
Nuchal crest	Present	Absent	Absent
Longus capitis depression	Present		
Rocker jaw	Polynesian/Hawaiian		

these individuals can be classified as such. The vast majority of the Potter's Field burial population had morphological traits characteristic of Caucasoids.

PLATE 9-13: African-American Female Skull (Burial 11,236 A)

L. POSSIBLE OCCUPATIONS OF THE DECEASED

Markers of skeletal stress are indicators of repetitive action that an individual incurred during life. These markers can be in the form of strong muscle attachments that indicates which muscles have been utilized extensively (left or right handedness may be discernible as well). The aim of this phase of analysis is to establish the relationships between occupational stress and industrialization, medical, and orthopedic problems (Iscan and Kennedy 1989). The importance in these studies is the effort to reconstruct lifeways from the human skeleton.

Thus, the osteological signatures that may have been the result of an occupation (repetitive actions) were recorded during the osteological analysis of the Potter's Field burial population. Pronounced muscle attachments would be indicative of a certain movement and action, and thereby, may suggest certain occupations or activities which can be associated with a specific individual.

Death Certificates often list the deceased's occupation (when known), and thus, markers of skeletal stress when matched with a Death Certificate which lists occupation, may be an additional line of evidence in determining an individual's occupation and sometimes allowing identification of a specific individual. In one of the Potter's Field case studies discussed in Chapter 11, the positive identification of an individual was strongly supported by markers of skeletal stress that could be related back to that individual's occupation that was listed on his death certificate.

The markers of occupational stress are rarely the result of a single incident but are the accumulation of repetitive actions. Gender, age, social status, nutritional quality and quantity, life-style, and general health are all critical components in the signature of a stress marker (Iscan and Kennedy 1989).

Iscan and Kennedy (1984) describe a number of markers of occupational stress that have been attributed to repetitive activity by medical and anthropological investigators. This list is not all inclusive, but does give an idea of various skeletal stress markers attributed to various types of physical labor (lifting, bending, squatting etc.). For example, severe arthritis, specific to a certain joint, may be indicative of repetitive stress or injury to said joint and relate back to an individuals occupation.

Strong muscle attachments suggest repetitive motion typically of the extremities. Each muscle is associated with a specific movement or action and thus, by observing pronounced muscle attachments, one can suggest body movement and perhaps activity or occupation directly associated with such specific movements.

M. PATHOLOGIES

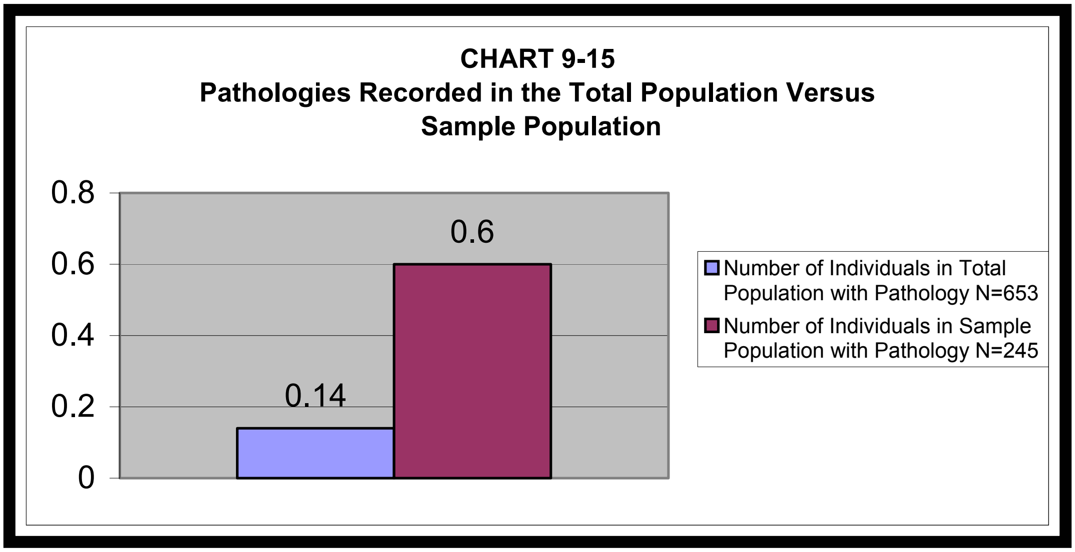
Taber's Medical Dictionary (1989) defines pathology as the study of the nature and cause of disease, which involves changes in structure and function. The most common pathology in the human skeleton is degenerative change such as arthritis and osteoporosis. Trauma is the second most common pathology and includes such things as fractures and dislocations. Infectious disease has always been a major cause of death. Very few infectious diseases leave a mark on the bone and the ones that are observable look like several diseases – making diagnosis difficult, if not impossible.

Osteitis is defined as an inflammation of a bone caused by some unknown infection or injury. Osteomyelitis is bone inflammation caused by bacteria that entered the bone through a wound of some kind; it usually involves the marrow cavity in long bones. An involucrum typically is observed around the long bone and one or more cloaca (created by the body for pus drainage) is usually present. Periostitis is not a disease. It is an inflamed periosteum caused by trauma or infection. Periostitis only involves the outer portion of the bone.

Osteologists are commonly limited to the study of the static appearance of the skeleton at time of death (White 2000). Very few diseases leave signatures on the bone. When pathologies are observable on the bone, the signatures can often be the result of several diseases and thus, diagnosis is difficult at best. The osteologist must first describe and photograph/draw the pathology (i.e., the observable skeletal abnormality or anomaly) and then diagnose the cause/disease.

The pathologies observed during the analysis of the Potter's Field burial population were divided into eleven subcategories for analysis and include: amputation, autopsy, bone miscellaneous, dentition (dental disease), trauma due to violence, fusion (fused bones), lesions, infection, osteoarthritis, developmental, and fracture.

Of a total burial population of 4,571 individuals disinterred from Potter's Field, numerous skeletons were very poorly preserved thereby prohibiting accurate observations and studies of skeletal pathologies. Nearly 57 percent of the individuals interred at Potter's Field were in poor osteological condition and were, in essence, 'too deteriorated' to make accurate observations regarding pathologies. Thus, after eliminating the individuals contained within the 57 percent of poorly preserved burials, an "observable population" was created. This "observable population" numbers 1,966 skeletons of which 654 individuals displayed clear evidence of skeletal pathologies (Chart 9-15). Indeed, there were observable pathologies on 245 individuals contained within the osteological study sample population.



1. Amputation

Amputation is defined as the removal of all or part of an extremity such as an arm, hand, fingers, leg, foot, or toes. The amputation may be at the joint or may be in the middle (or shaft) of the bone (Plate 9-14). Amputation at the joint is called disarticulation. Disarticulation involves the amputation at the joint when the soft tissue, muscles, and tendons are cut away and the bones are separated. Disarticulation does not involve any cutting of the bone itself. An amputation may be accidental as might be found or occurs in war wounds, vehicular accidents, and/or machinery accidents. Amputation may also be inflicted by accidental or intentional acts of mutilation. Most commonly, amputation is the result of a surgical process in which an extremity is removed as a medical life saving attempt when the extremity is severely infected and/or structurally damaged.

PLATE 9-14: Amputated Femur with Saw Mark at Midshaft of Bone

In the osteological material, it is important to look for signs of healing, infection, or deliberate saw marks to positively identify an amputated limb as opposed to post depositional deteriorization. Merbs (1983:181) describes the healing process following an amputation (also see Steinbock 1976). Typically once an extremity is removed, callus begins to develop after two weeks to narrow the exposed medullary cavity. After several weeks (or months), a bony cap forms over the cavity and there is a rounding and smoothing of the stump. Atrophy may follow due to disuse of the limb and may lead to osteoporosis.

Less than one percent (N=24) of the total Potter's Field burial population exhibited evidence of amputations. Ten amputated limbs (two percent of the population) were included in the osteological study sample population. Some amputated limbs had been afforded their own burial and in one case interred in its own casket (Plate 9-15). Another individual evidently died in surgery as both the deceased individual and his amputated leg were buried in the correct anatomical position (Plate 9-16).

PLATE 9-15: Amputated Leg of Adult in Wooden Child's-Sized Coffin

PLATE 9-16: Example of Amputated Femur. Lower Amputated Leg Discovered In Situ in Anatomical Position Within the Grave Shaft

2. *Autopsies*

An autopsy is the examination of the organs and tissues of a body to determine the cause of death or examine various pathological conditions/cases. Autopsies are routinely done in modern times when an individual does not die in a hospital setting and further investigation is needed to determine the cause of death.

There were a number of cranial autopsies evident in the burial population form Potter's Field. It is very likely that the Hudson County Mental Disease Hospital conducted numerous cranial autopsies to understand the condition of mental disease. Generally, autopsies are readily visible on skeletal remains by the presence of straight, smooth cut marks that go all the way through the bone as the medical examiner opens up the body to look at the internal organs to determine the cause of death or to understand a unique pathology. However, there was no other evidence of post-cranial autopsy in the Potter's Field burial assemblage; quite probably due to the poor preservation condition of the ribs and sternum of most of the recovered burials (a common location to observe cut marks that are the result of an autopsy) may have masked the ability to identify post-cranial autopsies.

A total of 95 autopsies (two percent of the total burial population) were recorded for the overall burial population from Potter's Field. When the statistics for autopsies observed in the total burial population eliminates the 58 percent of the individuals in which minimal to no osteological information could be recorded, the percentage of autopsies in the total observable population rises to 4.8 percent. Seventeen of the cranial autopsies recovered from the total burial population were included within the osteological sample and thus, four percent of the osteological sample had been autopsied.

PLATE 9-17: Common Method of Cranial Autopsy with Drilled Holes and Cut Line

The common method of cranial autopsy – based upon detailed osteological analysis – was to first drill holes into the skull along the desired cut line and then to insert the saw blade to make the cut (Plate 9-17). The drilled holes may have also severed a secondary purpose – to release cranial pressure prior to cutting open the skull. A few other cranial autopsies were also performed without the drilling of holes but by simply making a clean cut through the cranium (Plate 9-18). The variation in technique of cutting open the cranium may simply be technique of choice and/or training; or may depend on what area of the skull, brain cavity, or brain the medical examiner is trying to access.

PLATE 9-18: Alternative Method of Cranial Autopsy, Simple Cut Line

3. Bone Miscellaneous

The miscellaneous bone pathology category was established for unusual cases that were not found in large numbers during the analysis of the Potter's Field burial population and whose identifiable pathologies were highly atypical.

One "Bone Miscellaneous" case was the cremated remains of an individual, the only one identified and recovered from Potter's Field. (Plate 9-19). Cremation is a mortuary practice that involves the intentional burning of the body. The crematory remains weighed 3,276.7 grams (7.2244 pounds). According to the historical records, these remains represent the cremation of an adult male, and the osteological analysis concurred that this individual was an adult, but could not recover sufficient evidence to determine the gender of the individual. The remains from this cremation were once contained within a metal box that was subsequently badly deteriorated.

Exposure to heat causes systematic color changes in the bone that may provide information about the heat source and its intensity. Bone burned at a low temperature (200 to 300 degrees centigrade) turns a brown or black (smoked) quality. Cremation at higher temperatures (800 degrees centigrade or above), turn the bone a "calcined" white to a blue-gray color (cf., Buikstra and Swegle 1989). It is important to determine if the bones were burned after they were dry or while the flesh was still adhering to them. Cremated bones that exhibit cracking and splitting were burned after the bone was dry. Cremated bones that have transverse and longitudinal checking and splitting plus marked warping indicates that the bone was "green" or had flesh on it when burned. The crematory remains at Potter's Field were burned with the flesh on the bone at relatively low temperatures (Plate 9-20).

PLATE 9-19: Cremated Remains of Adult Male

PLATE 9-20: Selected Cremated Bone Fragments

A second example of a "bone miscellaneous" pathology case is that of a calcified mass that was discovered *in situ* within the lower abdomen of a woman who was identified as being over the age of 60 years (Plate 9-21). This mass measured 9.46 centimeters in diameter, 30 centimeters in circumference, and weighed 484.7 grams. The exterior of the mass displayed calcified veins and an evidence indicating that at one time the mass was porous. After substantial consultations with the medical team members at the University of New Mexico Hospital (Albuquerque), it was determined that this mass most probably represents an ectopic endra-abdominal placenta (a failed pregnancy in which the placenta could not be expelled). This woman probably carried this around for many years (possibly 20 or more years), and it was not the cause of her death.

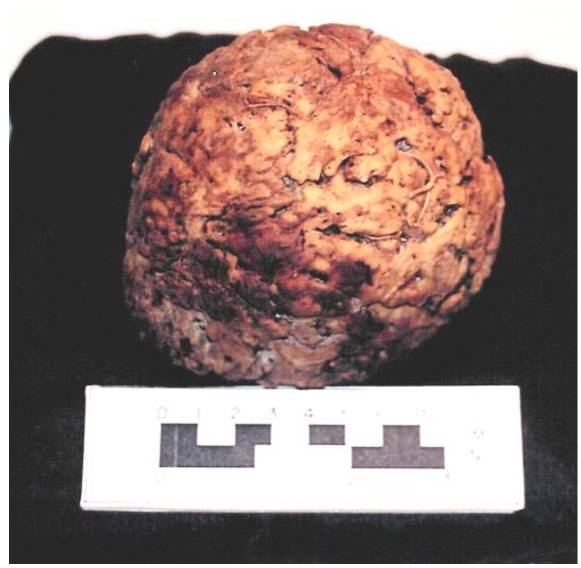


PLATE 9-21: Calcified Placenta Recovered from Woman's Lower Abdomen

4. Dental Disease

Dental health is of major importance to the health and survival of a human individual. Through mastication (chewing), food is processed into a form that can be digested more readily in the stomach so that nourishment can be extracted. The tempro-mandibular joint and the dental occlusion are fundamental to this process. There are several dental pathologies that were observed within the Potter's Field burial population including caries, periodontal disease, attrition, and impaction.

Dental caries are commonly called cavities. It is tooth decay that results in tooth destruction (Plate 9-22). Caries represent a progressive disease that is infectious and transmissible. Dental caries are one of the most prevalent chronic diseases affecting the human body (Aufderheide and Rodriquez-Martin 1998). If untreated caries can lead to abscesses. Untreated abscesses will lead to systemic infection and can result in death.

PLATE 9-22: Example of Poor Dental Health with Both Crown and Root Caries

Early humans had fewer caries than modern populations. The higher incidence of caries in agricultural societies as opposed to hunter and gatherer societies is attributed to dietary change – specifically the introduction of carbohydrates and processed sugars into the human diet.

There are two distinct types of caries; these are (1) one affecting the crown of the tooth and (2) the other affecting the root of the tooth. Typically caries on the tooth crown are common to the young as that is the portion of the tooth that is exposed ware and food materials. Later in life, typically due to onset of periodontal disease, the tooth roots become exposed and root caries develop. Berger's osteological analysis of the Potter's Field sample burial population (N=409) indicated that 85 of these individuals had caries (approximately 21 percent of the sample population). In addition, a total of 185 individuals contained within the osteological sample burial population were observed to have some type of dental pathology, while 250 individuals within the total burial population from Potter's Field displayed evidence of dental disease or pathology.

Periodontal disease is an inflammatory response to one or more irritants that results in the resorption of the alveolar process. This creates an abnormally large distance between bone and the cemento-enamel junction of the tooth (Plate 9-23). A total of 31 individuals (7.7 percent) contained with the sample population displayed evidence of major periodontal disease.

A common irritant is the build up of plaque and calculus. Plaque is a sticky coating of protein, food particles, and living and dead microorganisms (Ortner 2003). Once the plaque mineralizes it becomes calculus. The sample population which received additional study during the detailed osteological analysis revealed 18 individuals (4.4 percent) with calculus formations.

Dental attrition is commonly referred to as dental wear. It is the deterioration of the crown of the tooth due to everyday use associated with grinding and chewing (Plate 9-24), and is common to old age. The different degrees of wear can be used as a secondary line of ageing an individual. Dental attrition can be observed on the occlusal, incisal, and proximal surfaces of the tooth. A total of 57 individuals (14 percent) from the sample population displayed evidence of extensive dental attrition.

PLATE 9-23: Periodontal Disease Due to Heavy Calculus

PLATE 9-24: Severe Dental Attrition Associated with Old Age

It is common in old age for tooth loss to occur due to a number of possible causes such as caries, periodontal disease, and attrition. When all of the teeth are lost and the alveolar bone has resorbed the mandible or maxilla is said to be edentulous (Plate 9-25). At this stage false teeth are often used to assist in the mastication of food. A total of 30 individuals (4.2 percent) within the sample population suffered from severe edentulous.

PLATE 9-25: Severe Case of Edentulous Mandible

Impacted teeth are the result of the jaw being too small to allow the teeth to erupt normally. Individual teeth will be obstructed and, in an attempt to find their way to the surface, they often take a horizontal route as opposed to the normal vertical route through the bone (Plate 9-26). This anomaly can result in discomfort and malocclusion of the dental arch. Only five individuals (0.012 percent) from the sample population displayed evidence of impacted teeth.

PLATE 9-26: Example of Severe Case of Impacted Molars

5. Trauma

Trauma is defined as a physical injury or wound to the bone caused by external force or violence. There are seven types of trauma recorded in the Potter's Field burial population: (1) fractures, (2) dislocations, (3) Schmorl's nodes, (4) evidence of wounds from weapons, (5) bone wounds inflected from sharp objects [but not weapons], (6) wounds from blunt objects, and (7) surgery. In the United States today, trauma is the primary cause of death for individuals between the ages of one and 38 years. It is often difficult to determine if the trauma to an individual was caused by accidental external force or by an intentional violent act. The size, shape (morphology), and location of the wound(s) are the best indicators when analyzing osteological remains to determine the type or nature of the trauma involved and if violent death of the individual occurred as a result of this trauma.

An injury that occurred prior to death will show signs of healing. The signs of healing will be manifested in callus formation or thickly rounded surfaces characteristic of bone remodeling and can be classified as antemortem trauma (Burns 1999). Perimortem trauma happens at or about the time of death and the bone has not had the opportunity to begin remodeling. Staining or weathering should be consistent with the associated bone. Postmortem trauma damage occurs after death. Dry bone breaks differently than bone with flesh attached, thus postmortem trauma should be readily detected. Furthermore, if the postmortem trauma occurred long after death, the break in the bone will look fresh and have a much different coloration than the remainder of the bone.

This section on trauma is divided into two parts – (1) those fractures caused by accidental or undetermined external force and (2) those fractures that are the result of a violent or unusual acts that result in identifiable fractures such as gun shot wounds, and cutting wounds – as the Potter's Field burial population exhibits both types of traumatic injuries and deaths.

Each type of cutting blade has its own signature on the bone. A knife wound typically is small (as compared to a gunshot wound), clean, and sharp-edged. Knife wound variation is based by the size, type, weight, and sharpness of the knife. The signature of such a wound is that left on the bone which resembles the form of the tool or knife. Such an analysis often allows the forensic scientist or investigator with the ability to identify other wounds inflicted by weapons such as a hammer, screwdriver, ice pick, or so forth.

a. Fractures

Fractures are the structural failure (breaking) of bone or cartilage. Fractures are the result of abnormal stress against the bone. The stress can be high and sudden with the break happening quickly, or low continual stress until a break occurs (Figure 9-19).

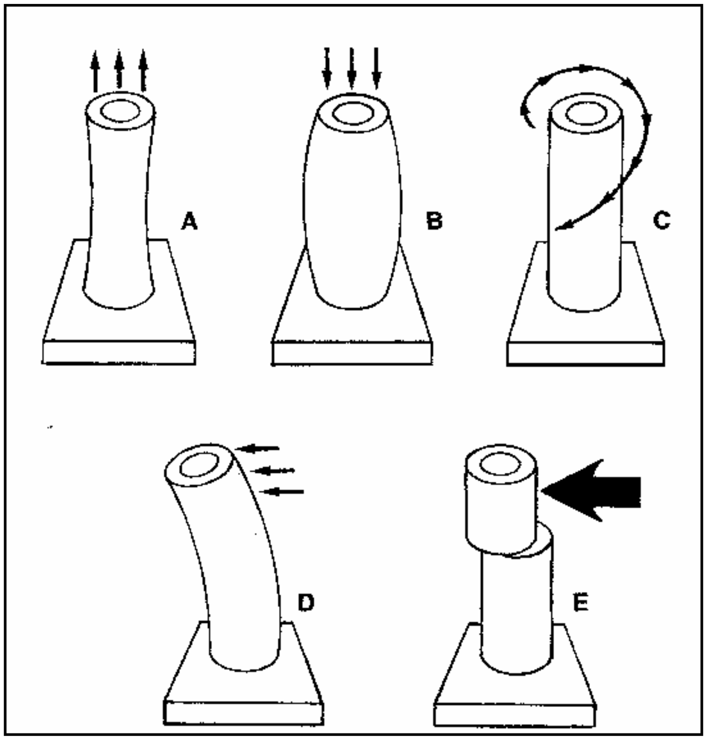


FIGURE 9-19: Types of Stress Applied to Bone Resulting in Fractures (from Ortner 2003:120)

There are five main types of fractures (cf., Buikstra and Ubelaker 1994). These types of fractures are defined as (a) *a complete fracture* which divides the bone into two separate parts, (b) a *comminuted fracture* which divides the bone into more than two parts, (c) a *spiral fracture* which is produced by torsion and the break spirals around the bone, (d) a *partial or greenstick fracture* which occurs when one side of the bone is broken while the other side of the bone is bent (seen most often in children), and (e) a *compression fracture* which occurs when a bone is crushed by downward forces (most frequently involving the anterior portion of a vertebral body) (Figure 9-20).

Additional types of common fractures are given special terms. Some are named after the people who first described them, while others were named for the activity that commonly resulted in a specific type of fracture. Still other common fractures are named to describe the way they look, while yet others are named for their anatomical location. Thus, we find that the terminology regarding fractures goes from a broad, overarching category or term to very specific categories or terms.

Fractures can be described as incomplete (the break does not extend all the way through the bone) and complete (the break divides the bone into two parts). Fractures can be described as simple (closed – did not rupture the skin) and compound (open – broke through the skin). A compound fracture would allow organisms to have a direct path into the bone and would likely result in infection. Pathological fractures occur when the specific bone has been weakened by an existing pathology such as lytic lesions, tuberculosis, or osteoporosis.

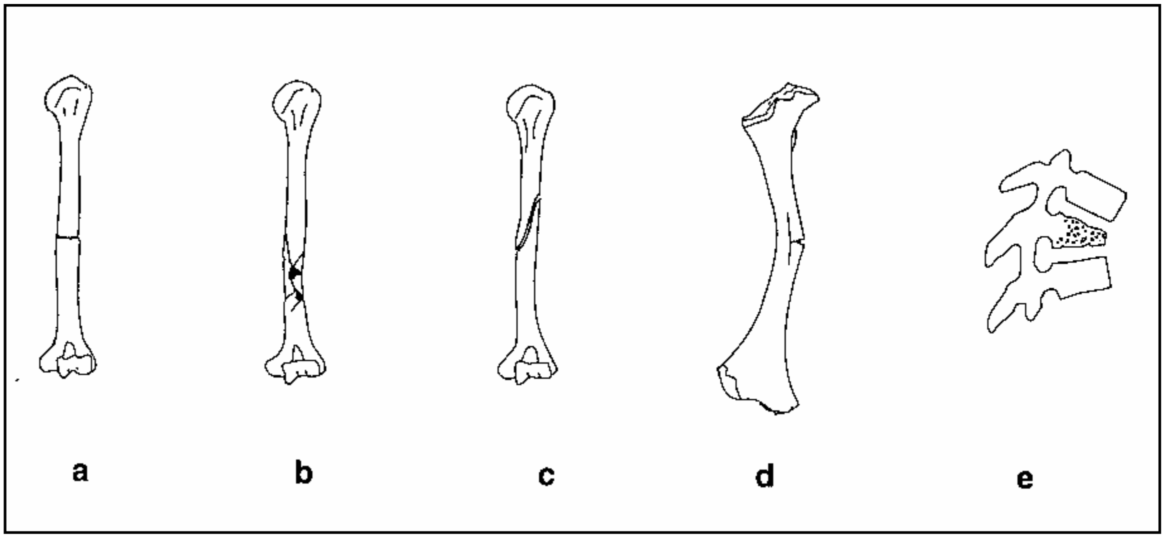


FIGURE 9-20: Types of Bone Fractures. (from Buikstra and Ubelaker 1994; after Mann and Murphy 1990)

When a bone is broken, blood vessels are usually ruptured and the muscles may get injured as a result of the impact. A hemotoma will typically form as a result of the injury. The normal healing of a fracture can be broken down into six stages. These are: (1) the blood of the hematoma coagulates six to eight hours after the incident, (2) the blood clot becomes organized with young connective tissue, (3) the young connective tissue is transformed into temporary callus, (4) the temporary callus is replaced by primary bony callus, (5) the bony callus is replaced by secondary bone callus, and (6) the affected bone undergoes functional reconstruction (Merbs 1983:163; after Weinmann and Sicher 1955). In young children, the bone is mended within two weeks and consolidated in four to six weeks. The adult bones are considerably slower to mend and usually take approximately three months – although the healing process, especially in older adults, may take up to four or five months.

There were 133 individuals (2.9 percent) from the total population collected from the burials of Potter's Field that exhibited osteological evidence of fractures. To understand the nature, type, and patterns regarding the occurrence of fractures within the Potter's Field burial population, analysis of the sample population (N=409) was undertaken to further examine injuries/fractures in greater detail.

Of these 409 individuals, 50 were found to have evidence of one or more fractures on their skeletal remains. Of these 50 individuals, 10 were females and 40 were males. Chart 9-16 and 9-17 present the fracture data from the sample population. Specifically, Chart 9-16 indicates the types of fractures found within the sample burial population, while Chart 9-17 indicates the location where such fractures occur on the skeletal remains. The frequencies in Chart 9-17 are based on a "per individual" basis, and several individuals suffered multiple fractures; thus, the total count of N=121 reflects a total of 121 fractures occurring on 50 individual skeletal sets. In addition, Plates 9-27 thru 9-30 illustrate a few examples of the various types of fractures observed on skeletal remains exhumed from Potter's Field.

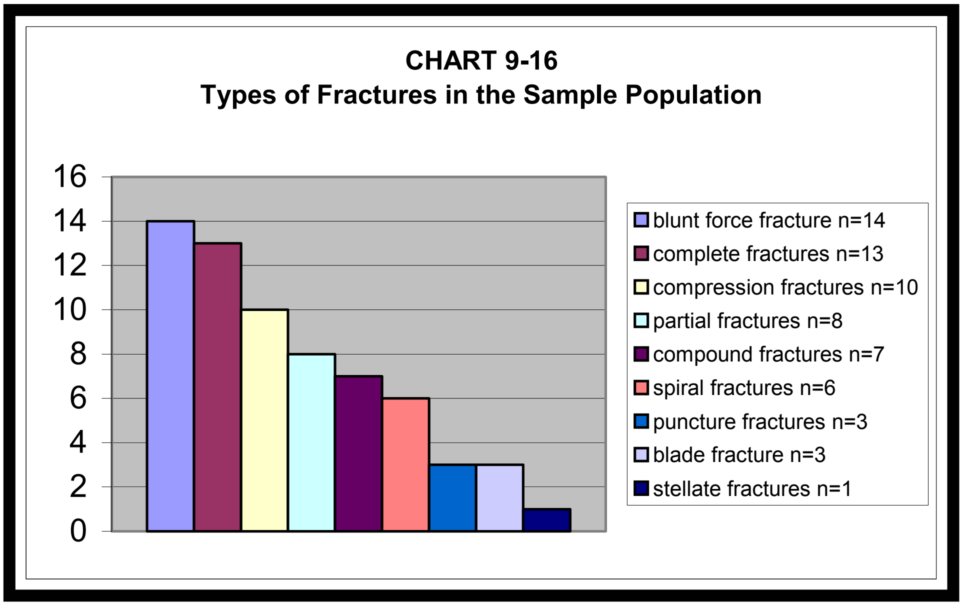


CHART 9-16
Types of Fractures in the Sample Population
16
14
12
10
8
6
4
2
0
blunt force fracture n=14
complete fractures n=13
compression fractures n=10
partial fractures n=8
compound fractures n=7
spiral fractures n=6
puncture fractures n=3
blade fracture n=3
stellate fractures n=1

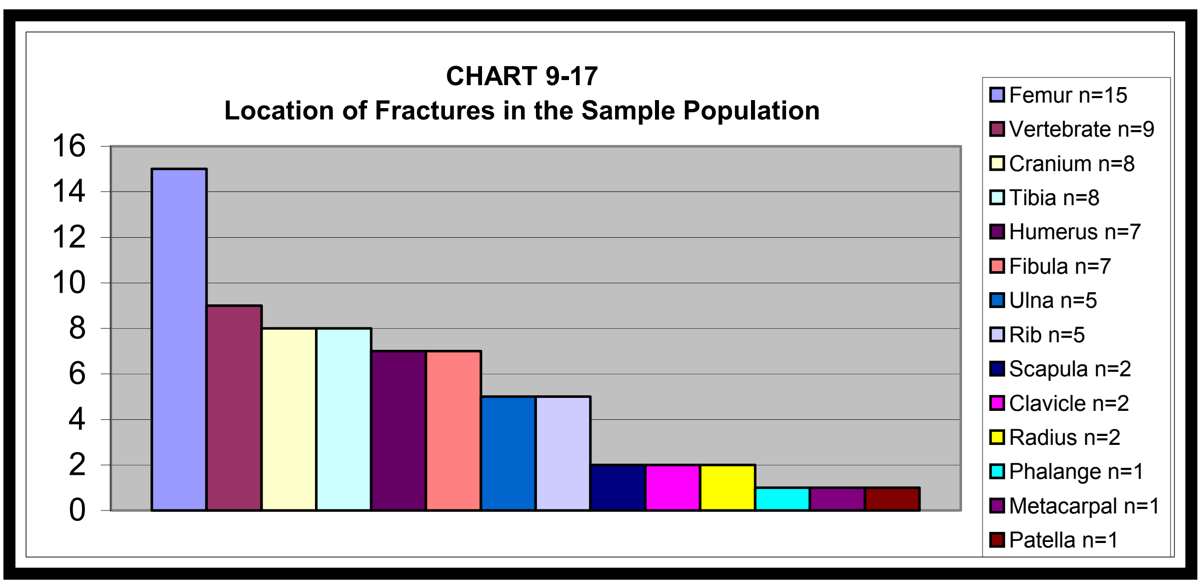


CHART 9-17
Location of Fractures in the Sample Population
16
14
12
10
8
6
4
2
0
Femur n=15
Vertebrate n=9
Cranium n=8
Tibia n=8
Humerus n=7
Fibula n=7
Ulna n=5
Rib n=5
Scapula n=2
Clavicle n=2
Radius n=2
Phalange n=1
Metacarpal n=1
Patella n=1

PLATE 9-27: Example of a Healed Compound Fracture

PLATE 9-28: Healed, Non-Union Fracture of Radius
Injury site was not immobilized and
bones did not grow back together
resulting in movable joint (arthrosis).

PLATE 9-29: Metal Bands Used to "Pin" Fractured Femur

PLATE 9-30: Victim of a Severely Traumatic Event Resulting in Multiple Fractures Throughout Body

b. Violent Trauma

When a fracture is the result of violence, the weapon can often be determined by the characteristics and shape of the wound.

1) Gun Injuries

Gunshot wounds generally have distinctive characteristics, particularly when the bullet hits a bone or bones. A low-power gunshot wound enters the bone rather smoothly with just a rounded hole resulting. A high-power gunshot would create a "starburst" fracture pattern as a result of rapidly expanding gases within the cranial vault (cf., Burns 1999). There are all kinds of bullets that vary in morphology and characteristics and all leave a variety of wound patterns on any bones which they hit. The shape of the wound and the amount of bone damage is directly related to the material the bullet is made of, the presence or absence of a metal jacket, and the extent of the jacket (full or partial). Full metal jacket rifle bullets usually exit the body. Partial jackets or hollow-point bullets expand and often do not exit the body. Gunshot wounds can also provide information about the trajectory and, tentatively, the caliber of the weapon. A typical exit wound is larger than the entrance wound and would bevel outward. The entrance wound is smaller than the exit wound and is beveled inward.

Shotgun wounds have a different wound morphology than rifles or handguns. The size of shot and distance to the target would greatly differentiate in the signature of such a wound. The margin of the wound would be scalloped and would be slightly beveled at the entrance wound. Shotgun pellets rarely exit the body (Burns 1999).

Only one individual recovered from Potter's Field displayed clear evidence of gunshot wounds. A young (20 years of age) adult male exhibited evidence of being murdered by a large-caliber handgun. This individual was shot twice in the head, once to right parietal (Plate 9-31), and a second shot which entered near the base of the skull (Plate 9-32). The bullet from the second shot was recovered from inside the skull during exhumation and analysis.

PLATE 9-31: Gunshot Entrance Wound in Right Side (Parietal) of Young Male's Skull

PLATE 9-32: Second Gunshot Entrance Wound Near Base of Skull at Neck

2) Blunt Force Trauma

Blunt round and blunt oval describe the morphology of depressed fractures – usually found on the cranium – that are typical of a violent act. Evidence of blunt force trauma is the presence of concentric cracks and bone fragments bent inward. The bone fragments are depressed inward because there is a more complete fracture of the outer table than the inner table of bone. One example of blunt force trauma was recovered from Potter's Field (Plate 9-33).

PLATE 9-33: Blunt Force Trauma; Stellate Fracture of Cranium Caused by a Hammer

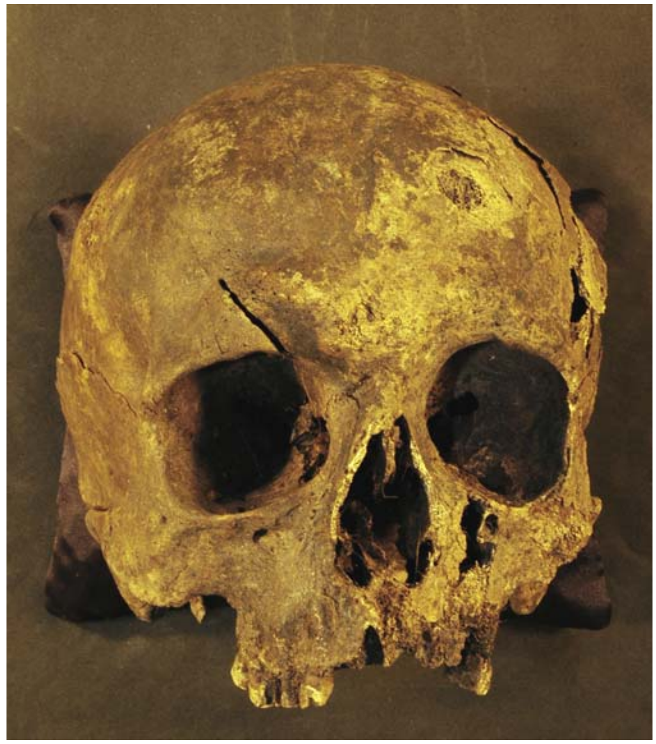


PLATE 9-34: Example of Bladed Trauma

3) Bladed Fracture Wound

Edged or bladed fractures refer to sharp force trauma as would be inflicted by knives or axes. An example of a bladed fracture wound of the frontal bone is illustrated in Plate 9-34. Only one individual from Potter's Field displayed evidence of bladed fracture wounds.

4) Unidentified Blow(s) to Skull

Two cracked skulls were observed at Potter's Field for which the instrument that delivered the blow remains unknown. One individual appears to have received a severe blow to the left rear of the skull that resulted in a cracked cranium. There was no sign of healing and thus, this was most likely the cause of death (Plate 9-35). It is undetermined if the second individual accidentally fell and fractured the skull or if the fracture was the result of a blow to the head. No impact wound or depression was observed (Plate 9-36).

PLATE 9-35: Blow to the Left Rear Side of Skull Cracked Skull Open Resulting in Death

PLATE 9-36: Unhealed Fractured Cranium Which Caused the Death of this Individual

6. Fusion

The Potter's Field exhumations recorded numerous observations of various bones which had become fused to one another. There appear to be various explanations as to why such osteoblastic activity occurs in certain areas, but it is usually associated with the healing process brought about by recoveries from infection or severe trauma. Bone fusion may also be a congenital abnormality.

Trauma or disease affecting adjacent bones may result in ankylosis (the abnormal fusion and immobility of a joint). The ossification of connective tissue such as muscles may fuse bones together and is usually the result of trauma. Osteophytes are small, abnormal bone growths that are normally located in areas where tendons and/or ligaments attach to bone and grow in response to either infection or trauma. Lesions of myositis ossificans traumatica usually occur at the origin or insertion of tendons and ligaments. These bony projections are probably the result of repeated hard use of the muscle (repetitive activity) over a relatively long duration of time rather than a single traumatic event (cf., Ortner 2003:158).

There were 106 individuals (2.3 percent) in the Potter's Field burial population that exhibited fused bones. Of these individuals which had fused bone, four percent (N=75) were males while five percent (N=31) were females. Some examples of fused bones from Potter's Field are illustrated in Plates 9-37 through 9-41.

PLATE 9-37: Sacrum Fused to Pelvis Resulting in Greatly Impaired Mobility for Individual

PLATE 9-38: Fusion of Both Elbows Effectively Eliminating Mobility of Lower Arms

PLATE 9-39: Fusion of Tibia and Fibula Resulting from Healing of Fractured Tibia

PLATE 9-40: Fused Rib Fragment

PLATE 9-41: Synostosis of Tibia and Fibula

7. Lesions

Lesions are areas of the bone that have been destroyed or "eaten away". There are many pathologies that initially exhibit as lesions and thus, it is often impossible to diagnose the cause of a lesion without additional disease characteristics. Lesions can be the result of infection, condition, and/or disease. A glimpse at some of the lesions observed in the Potter's Field burial population are described and illustrated below.

a. Infection

Prior to the discovery of antibiotics, approximately half of the population died before adulthood due to infectious disease (cf., Ortner 2003:180). Infectious disease may be endemic (that is a disease that occurs continuously in a population) or as a secondary affect of trauma. Infection rarely leaves skeletal evidence and thus; the approximate number of individuals that may have died due to infection will be grossly under estimated if such estimations are made solely on the basis of skeletal data.

Bone becomes inflamed due to a number of causes including infection. Bone cancer and trauma can also elicit the response of inflamed bone. There are several types of bone infection. Osteomyelitis is an infectious condition that begins in the marrow spaces of bone and primarily affects the inner (endosteal) surface. Osteitis describes an inflammatory condition in compact bone. It may be associated with infection but may also be caused by other pathological conditions. Osteomyelitis is most often the result of bacteria entering the bone. Infectious bacteria reaches the bone by several possible avenues including (1) through traumatic or surgical wounds, (2) soft tissue infections that spread to the bone, and (3) through the blood stream from some remote location in the body that has become infected. In over 90 percent of such cases, the cause is a staphylococcus aureus "Staph" infection. The second most common cause of osteomyelitis is Streptococcus "Strep" infection.

The Potter's Field osteological sample burial population contained 93 cases (22.7 percent of the sample population) of bone infection. Plates 9-42 and 9-43 illustrate a few examples of bone infection discovered within this sample population.

PLATE 9-42: Osteomyletis on Left and Right Fibula

PLATE 9-43: Osteomyletis on the Distal End of Fibula

Periostitis is the reaction to pathology in the underlying bone matrix. The periosteum forms abnormal bone in response to trauma, infection, and disease. It can occur in three different ways; these include (1) the spread of a soft tissue infection, (2) in response to a generalized disease, and (3) a surfacial exhibit of osteomyelitis or osteitis. The result of localized infections would present itself as periosteal bone deposition with or without a small sequestrum. Periostitus will not have cloacae, involucrum, or change in the marrow cavity and tends to be superficial to the normal cortex. Periostitis is an inflammation within the periosteum that will affect the outer surface of the bone. Pathological conditions other than infection may cause periostitis, thus infectious causes must be identified (Ortner 2003:181). There were a total of four cases of periostitis within the Potter's Field burial population (Plate 9-44).

PLATE 9-44: Example of Periostitis

b. Degenerative Joint Disease (DJD)

Osteoarthritis is a degenerative joint disease that is non-flammatory, chronic, and progressive. It begins with a lesion that eventually leads to the loss of cartilage. The loss of cartilage in-between the adjacent bones results in the bones rubbing directly against each other. This bone-against-bone contact results in new bone formation that is characterized by bone lipping developed by a bone spur or osteophytic growth on the margin of the articular surface. Two other osteological indicators of degenerative joint disease are porosity on the articular surface and eburnation. Eburnation is a polishing of the joint caused by bone rubbing against bone as a result of the degeneration of the cartilage in the joint.

Osteoarthritis usually presents symptoms around the age of 40 years. It progresses as one gets older and occurs equally in men and women. Most cases of degenerative joint disease (at least 80 percent) are considered to be primary or idiopathic where no specific cause can be determined. Secondary degenerative joint disease occurs when the joint has been compromised by disease or insult which may be physical (trauma, dislocation), infectious, metabolic (rickets, ochronosis), vascular (osteochondritis dissecans), neurotrophic (peripheral neuropathy), or other arthritis forms (such as rheumatoid). Additional causal or contributing factors include obesity, occupational stress, congenital deformities, diaphyseal angulations, or limb asymmetry (cf., Aufderheide and Rodriquez-Martin 1998:93).

Degenerative joint disease is the most frequently identified disease in the archaeological/ osteological record, and is the most common disease in the modern world. It is simply a product of ageing with the moveable joints wearing out due to years of continual repetitive use. It can, however, develop beyond being a mild inconvenience of moderate pain to a severe or major disability – should it progress into the joints, subsequently fusing together various bones and ultimately limiting limb and body movement.

A total of 56 cases (14 percent) from the Potter's Field osteological sample burial population had marked osteoarthritis (Plates 9-45 thru 9-47). Of these 56 arthritic cases, the average age was 42.5 years, with the youngest individual displaying this disease being 35 years of age and the oldest being 79 years of age. Eleven of the 56 individuals were female (19.6 percent), while 44 were male (78.7 percent). One individual was of indeterminate sex. This results in a 1:4 ratio of occurrence in females to males – possibly a result of males of this period in time and from this set of socio-economic occupations, being significantly more exposed to hard labor which ultimately resulted in increased rates of osteoarthritis.

PLATE 9-45: Example of Osteoarthritis of Patella (Knee)

PLATE 9-46: Example of Osteoarthritis in Calaneous (Heel)

PLATE 9-47: Example of Severe Osteoarthritis of Elbow

In areas where the osteophytic growth is extreme, the adjacent bones can become fused which results is osseous ankylosis. Thus, in addition to these cases of severe osteoarthritis, a total of 33 individuals from the sample population (8.1 percent of this sample population) exhibited osseous ankylosis at various articular surfaces (Plate 9-48 and see Plate 9-51).

PLATE 9-48: Example of Ankylosis of Several Vertebrate from Three Different Individuals

c. Degenerative Disease of the Spine

Degenerative disease of the spine is one of the most common lesions found in the archaeological record. Most people over the age of 40 years will have osteoarthritis of the spine. This condition is caused when the inter-vertebral disks degenerate, which is followed by osteophyte formation and porosity of the vertebral body. Osteoarthritis of the vertebrate most commonly occurs in areas where the spine bends such as the lower cervical (C5-C6), lower thoracic (T8-T9), and the lower lumbar (L4-L5). Within the Potter's Field osteological sample population of 409 individuals, 40 skeletons displayed clear evidence of osteoarthritis of the spine (Plates 9-49 and 9-50).

Kyphosis is a pathology that results in the abnormal anterior curvature of the lower (thoracic) spine in excess of 40 degrees (Plate 9-51). This deformity may be the result of changes to the inter-vertebral disks (primary) or in the degeneration of the vertebrae in the thoracic region (secondary). Only one individual within the sample population from Potter's Field was identified as suffering from kyphosis. This person also suffered from ankylosis.

Juvenile and senile kyphosis are both known to exist. Juvenile kyphosis primarily develops due to the extrusion of the cartilage disk into the adjacent vertebral bodies (Schmorl's nodes), followed by the narrowing of disk space, and a growth disturbance in the anterior vertebral body resulting in a wedge shaped vertebrate (Ortner 2003). The apex of the curvature occurs between the eighth to tenth thoracic vertebrae. Juveline kyphosis occurs predominately in males.

PLATE 4-49: Example of Osteoarthritis on Dens Epistrophei of Axis

Plate 9-50: Example of Porous Degeneration of Diarthrodial Joints Due to Osteoarthritis

PLATE 9-51: Example of Both Ankylosis and Kyphosis

Senile kyphosis is a common deformity of the spine that typically begins to occur around the age of 50 years. This is caused by the degeneration of the anterior portion of the inter-vertebral disks in the upper thoracic region of the spine. Wedging of vertebral bodies is very slight or completely absent in senile kyphosis. Diagnostic traits of this deformity include osteosclerosis of the anterior portion with marginal lipping and occasionally anterior fusion of several vertebrate. Disk herniations are not characteristic in this deformity.

Secondary kyphosis may be caused by conditions such as osteoporosis, hyperparathyroidism, and Paget's disease. Wedge vertebrae due to compression fractures are common.

Herniated inter-vertebral disks results in the narrowing of the space between the vertebrate that allows the two adjacent vertebrate to have direct contact. A vertical disk hernia is when the disk protrudes into the body of the adjacent vertebral body. The osteological signature from this type of herniated disk is called a "Schmorl's node", and occurs in most people over the age of 45 years (Plate 9-52). Other types of disk hernias include lateral and anterior which cause osteophytosis, but not osteolysis and posterior disk hernia which causes osteolysis of the posterior margin of the vertebral surface. Six individuals from the sample population displayed evidence of having vertical disk hernias as evidenced by the presence of Schmorl's nodes.

PLATE 9-52: Example of Osteoarthritis of Vertebra Along with Schmorl's Nodes Indicating Vertical Disk Hernias

d. Diffuse Idiopathic Skeletal Hyperostosis (DISH)

Diffuse Idiopathic Skeletal Hyperostosis (DISH) is a pathological condition that produces excessive bone growth at joint margins. It is diagnosed by the bony bridging of a minimum of four vertebrate on the anterolateral aspect (Plate 9-53). This bony growth has the appearance of dripping candle wax. It is not really arthritis but often occurs in conjunction with arthritis. It is an ossification of the ligaments and most frequently occurs in the spine. In the spine, the abnormal bone growth occurs beneath the anterior longitudinal ligament. The bony growth occurs only on the right side in the thoracic region in part because the descending aorta overlays the left thoracic vertebral bodies (Ortner 2003). The causative agent of this disease remains undetermined. It rarely occurs in individuals less than 40 years old and approximately two-thirds of the cases are male. The occurrence of DISH increases with age and is common in individuals over 60 years of age. DISH also occurs on the inner table of the cranium (hyperostosis frontalis) (Plate 9-54), and as calcaneal spurs.

Six individuals from the Potter's Field sample population were diagnosed with Diffuse Idiopathic Skeletal Hyperostosis (DISH). The ages of these six individuals are Burial 689A – 51 years, Burial 791B – 63+ years, Burial 690B – 39 years, Burial 418B – 54+ years, Burial 15,221B – 42 years, and Burial 1,036B – 70+ years. With the exception of Burial 690B, all remaining five individuals fall within the expected age range to develop DISH, and the individual represented by Burial 690B is only one year short of the anticipated age for the onset of this condition.

PLATE 9-53: Vertebral Column Illustrating DISH

PLATE 9-54: Skull Showing Evidence of Possible Endocranial DISH

e. Tuberculosis

Tuberculosis (TB) is a chronic infectious disease caused by mycobacterium and is spread by airborne vectors associated with the respiratory tract. The primary focus of TB is in the lungs, followed by the regional lymph nodes. Tuberculosis usually heals without becoming a progressive disease. If it does not heal, however, the tubercle bacilli may be transported through the bloodstream to other tissues including the skeleton. Skeletal tuberculosis is typically the result of dissemination of the tubercle bacilli through the bloodstream (cf., Ortner 2003). Skeletal tuberculosis is rarely the cause of death in an individual.

Skeletal tuberculosis can only be observed in one percent of the individuals who have been diagnosed with TB (cf., Aufderheide and Rodriquez-Martin 1998). Thus, in theory and using this accepted patterned outcome, only four to five individuals in all of the Potter's Field burials (N=4,571) would exhibit the signatures necessary for a diagnosis of TB, even if those signatures were present on well-preserved skeletal remains.

At least 90 percent of the skeletal lesions that are directly associated with tuberculosis involve a joint. More than 40 percent of skeletal tuberculosis lesions involve the spine (Aufderheide and Rodriquez-Martin 1998). The spine is a good host for TB due to the presence of abundant trabecular bone and the high oxygen content from the abundant blood supply.

The diagnosis of skeletal tuberculosis from dry bones is often extremely difficult. There are many other diseases that result in lesions similar in characteristics to those associated with TB. The osteologists only chance of a certain diagnosis of TB is when it involves the spine. Four parameters to identify TB were developed by Buikstra (1976) and include (1) the age at death of the individual (TB is a disease of young people), (2) lesion morphology (circular, oval concave, or smooth-walled), (3) lesion location (spine and joints), and (4) extra-vertebral location (joints).

Skeletal tuberculosis is characterized by seven primary criteria (cf., Ortner and Putschar 1985). These criteria include (1) very little, if any, perifocal reactive bone formation is shown; the lesion is primarily or exclusively a lytic process, (2) in long bones, the process is localized in the metaphyses or in the epiphyses, (3) sequestra are very uncommon – except for spina ventosa, periosteal reactive bone formation is very limited, (4) involvement of soft tissue adjacent to bone, often with skin fistulae, is commonly found, (5) hematogenous dissemination to the synovium can preserve joint structure, but joints becoming infected by perforation from a metaphyseal abscess will commonly suffer severe anatomic disruption and even ankylosis, (6) like osteomyelitis, peripheal involvement of the growth palate in a growing bone may stimulate growth, but destructive involvement can arrest growth, and (7) healed areas remodel.

Tuberculosis (also known as consumption prior to 1885) was the leading cause of death until the late nineteenth century in the northeast United States (Kenny *et al*. 2003). Review of the burial registers for the Hudson County Burial Grounds indicate that 5.6 percent (N=554) of the individuals buried at one of the three burial grounds were patients at the Contagious Disease Hospitals that included the Tuberculosis and Smallpox Hospitals of the Hudson County Institutional Complex.

With only a very cursory scan of the entire Potter's Field burial population and its associated historical records, it was noted that at least 27 individuals had TB (0.6 percent of the total burial population). However, the sample of individuals that were selected for additional, more detailed osteological study revealed that of the Potter's Field sample population (N=409), at least 20 burials (4.8 percent of sample population) had historical records indicating that they had TB or displayed skeletal evidence of TB. Seven skeletons of this sample population clearly displayed osteological evidence of TB (Plates 9-55 thru 9-57), and indeed, the burial records confirmed that four of these individuals had been diagnosed while they were living with having TB. However, an additional thirteen burials were identified with the TB hospital but their osteological remains contained no visible TB skeletal signatures. A number of other individuals (in addition to the 20 individuals in the osteological sample) had lytic lesions. However, the bones were not in a good state of preservation state to allow for a positive skeletal TB diagnosis.

PLATE 9-55: Vertebra Displaying Evidence of Tuberculosis Lesions

PLATE 9-56: Skeletal Evidence of Tuberculosis of the Pelvis

PLATE 9-57: Individual from Potter's Field Displaying Multiple Skeletal Loci of Tuberculosis

f. Smallpox

Smallpox is a viral infection. Viral infections rarely leave a signature on osteological/skeletal remains. On rare occasions, viral lesions are manifested but the morphology of the lesion is indistinguishable from those that are the result of other pathologies.

Smallpox has historically been associated with large population areas. A worldwide vaccination program has recently eliminated this horrific and deadly disease. The last known case of smallpox was diagnosed in 1977.

There are two types of smallpox, variola major and variola minor. As the name implies, variola major is the more deadly of the two with a mortality rate of between 10 and 100 percent. Variola minor occurred in the United States and is considered mild with a mortality rate of less than one percent. In variola osteomyelitis (smallpox osteomyelitis), the arms are the preferred loci, especially in the elbow region and often bilaterally. The lesion starts near the growth plates and destroys the metaphyseal bone and separates the epiphysis. This can lead to pathological fracture. There would not be any sequestrium; however, pronounced formation of reactive periosteal bone would be present. Often the humerus, ulna, and radius are affected by lesions, whereas in most other infectious diseases the radius is not affected. Knees, wrists and ankles are the next most affected by smallpox however and joint can be involved. Arrested growth is the main skeletal deformity associated with this disease.

The historic records indicate that the Hudson County Smallpox Hospital buried the deceased within the three associated burial grounds including Potter's Field thus, the above discussion of the affects of smallpox on the skeleton is warranted. Skeletal involvement of smallpox begins sometime after one to four weeks of being infected. Smallpox only affects the skeleton of the young. If an adult contracts smallpox there will be no skeletal signature. None of the individuals exhumed from Potter's Field displayed skeletal evidence of smallpox.

8. Developmental Anomalies

a. Spina bifida

Spina bifida is the non-fusion of one or more neural arches within the spinal column. It is one of the most common congenital defects and typically occurs in the sacrum. The non-fusion of the neural arches for sacral units above to S4 is an expression of spina bifida. This congenital defect can be identified after the age of six when the neural arches of S1-S3 should be fused. When the neural arches of the fourth and/or fifth sacral vertebrae fail to fuse, the defect is said to have a sacral hiatus (Plate 9-58).

There are two types of spina bifida defects. Spina bifida occulta (SBO) is the incomplete fusion of the posterior neural arch and involves one or more sacral segments. Partial or incomplete fusion (spina bifida occulta) is when non-fusion above S4 does not extend throughout all sacral units. This occurs in less than twenty-five percent of any given population. Spina bifida occulta does not usually cause significant difficulties in life.

Spina bifida aperta or systica (SBA) is often fatal. If all sacral laminae fail to fuse the condition is complete (Spina bifida aperta). There are three grades of SBA (cf., Aufderheide and Rodriquez-Martin 1998). First is Megingocele where the meninges and nerve root extrude through the defective neural arch, but the spinal cord remains in the vertebral canal. This defect occurs most commonly in the lumbosacral region. The second is Myelomeningocele where the spinal cord, along with the meninges, is extruded through the defect. This is the most common type of SBA and usually occurs in the lumbosacral area.

The third is Myelocele where the skin and dura fail to close at the level of the defect and death from infection occurs shortly after birth if the infant is not treated. This is the most severe of all cases of spina bifida. Within the osteological sample population recovered from Potter's Field, there were 31 observable cases (7.5 percent of the sample population) of spina bifida (Plate 9-59).

PLATE 9-58: Example of Sacral Hiatus

PLATE 9-59: Example of Spina Bifida Occulta

b. Cerebral Palsy

Cerebral palsy is a comprehensive diagnosis for a group of non-progressive neurologic disorders that affect control of movement and posture. Symptoms range from mild to severe. Treatments for victims of cerebral palsy have only been widely available within the last 20 to 30 years. These treatments include pediatric walkers, pediatric positioning chairs, and dorsal rhizotomy. Dorsal rhizotomy is the surgical release of the spinal nerve roots innervating the affected limbs (http://www.marchofdimes).

The March of Dimes has determined that the etiology of cerebral palsy can be the result of several factors. These include maternal rubella infection, anoxia to the infant at time of birth, hyperbilirubinemia due to blood group incompatibility, and postnatal factors such as meningitis, encephalitis, or lead poisoning.

Clinical signs of cerebral palsy include: asymmetry in motion, twitching, stiffness, difficulty feeding, sucking or swallowing, failure to follow normal motor development, weakness, and mental retardation with severe cerebral palsy symptoms (Brunner *et al* 1974).

There are three recognized types of cerebral palsy. First is spastic cerebral palsy which presents itself as stiff muscles which makes movement difficult. Spastic cerebral palsy affects one to four limbs. Seventy to eighty percent of the individuals with cerebral palsy have this type. The second type of cerebral palsy is dyskinetic cerebral palsy which presents as fluctuating muscle tone. Muscle tone may vary from too tight to too loose. The resultant movements can be slow and writhing or rapid and jerky. Muscles of the face and tongue can be affected resulting in problems with swallowing, sucking, and speech. This type of cerebral palsy affects ten to twenty percent of cerebral palsy victims. Finally, there is ataxic cerebral palsy which effects balance and coordination. Five to ten percent of cerebral palsy patients have this type.

Most cerebral palsy victims die from complications secondary to immobility, such as aspiration pneumonia, or sadly, from neglect. With extreme tender loving care, children with cerebral palsy can live to be forty or fifty years of age. Medical caretakers report that individuals with cerebral palsy are often the sweetest patients. They have facial dystonia, which results in frequently smiling and gazing at the caregiver in such a loving and dependent way. When the head and neck are involved, feeding can be very challenging. There is an associated turning, twisting motion of the head into the pillow, very serpentine-like. It can be very frustrating, but when that playful loving relationship develops, this is what is so rewarding as a medical caregiver (P. Mitchell 2004:personnal communication).

There were two possible cases of cerebral palsy identified in the sample population at Potter's Field. One of the case studies in Chapter 11 describes one possible case of cerebral palsy associated with Burial No. 793A.

c. Congenital Anomalies

Congenital anomalies are structural defects present at birth. Any type of cell or body structure may be involved. The defects may be isolated, multiple, gross, or microscopic. The etiology of congenital anomalies may be genetic such as Down syndrome or teratogenic factors where the mother's activities such as taking medications such as thalidomide or tetracycline, use of alcohol, inadequate diet, infections and disease such as measles.

The list of possible congenital anomalies is endless. However, some examples of congenital anomalies identified in the Potters Field burial population include cleft palates (N=1), spina bifida (N=31; see discussions above), scoliosis (N=2), microcephaly (N=2), and Proximal Femoral Focal Deficiency (N=1) (Plate 9-60).

Cleft palates develop during the embryonic stage when there is arrested growth development. It may have a genetic disposition as it does primarily occur through family lines. It may be a feature of various syndromes such as Kniest's disease, progressive hereditary arthro-ophthalmopathy, congenital spondyloepiphyseal dysplasia and others (Aufderheide and Rodriquez-Martin 1998). Cleft palates occur in one per 1,000 births. Prior to medical treatment, cleft palates caused nutritional and respiratory distress, and the incidence of infant mortality was high.

Scoliosis is a genetic disorder in which the spine curves laterally and the vertebrae and spinous processes rotate towards the concavity of the curvature. The spine usually has a double curve that enables the skull to remain in the mid-saggital plane. There are multiple types of scoliosis including congenital, idiopathic, neuromuscular, and degenerative. Scoliosis has multiple etiologies including, but not limited to, congenital malformation of the spine, Down's syndrome, cerebral palsy, muscular dystrophy, polio, spina bifida, neurofibromatosis, pseudoachondroplasia, Marfan's syndrome, Melnick-Needles' syndrome, osteogenesis imperfecta, untreated infantile hypothyroidism, spinal muscular atrophy, tumors, paralysis, and trauma. Idiopathic scoliosis has an unknown etiology but often runs in families and thus, appears to be genetic. Two to three percent of the population is inflicted with scoliosis and there is no cure. It occurs all ages and genders, however, females are eight times as likely to exhibit extreme spinal curvature. It can limit activity level, is painful, and reduces respiratory function. Common treatments are back braces and spinal fusion.

Microcephaly is a congenital anomaly in which the cranium is unusually small. The etiology of this condition can be attributed to a number of possible causes such as the mother contracting German measles in her last trimester of pregnancy, congenital infections such as Tay-Sachs disease, abnormalities in chromosomes, and radiation (Zimmerman and Kelley 1982; Aufderheide and Rodriquez-Martin 1998).

Mental disease is common in individuals with this affliction as the brain is underdeveloped. The skeletal signatures of this anomaly include: recession of frontal and parietal bones, flattening of occipital bone, receding metal protuberance, head circumference below 46 centimeters, reduced cranial measurements, premature synostosis of all or most cranial sutures, and conoidal skull shape (Aufderheide and Rodriquez-Martin 1998). The post-cranial is often small, however, the head will be abnormally small when compared to the rest of the body. There is currently no treatment for microcephaly.

Proximal femoral focal deficiency (PFFD) occurs during embryonic development when the proximal end of the femur does not progress normally. The iliofemoral joint is almost always involved. In one case review (see Bryant 1991), the author noted that the acetabulum was normal in shape, but was 25 percent smaller than the contralateral side. The mother's use of Thalidomide during pregnancy is one possible cause of PFFD. The current incidence of PFFD is one in 50,000 births, and this figure has remained constant over the years.

PLATE 9-60: Individual with Possible PFFD

N. DESCRIPTIONS AND DATA OF OSTEOLOGICAL SAMPLE POPULATION

Table 9-3 presents the descriptions and data of all 409 burials which compose the osteological sample population from the Potter's Field total burial population. As discussed briefly at the beginning of this chapter, the osteological sample population was created so that additional, more detailed osteological and forensic analyses could be conducted upon a subpopulation of the total recovered burial sample (N=4,571). Thus, the 409 individuals who compose the osteological sample population, represent approximately nine percent of the total burial population.

Table 9-3 contains data for all 409 individuals contained within the sample population divided into 35 categories. These categories of information provided the data necessary to conduct the osteological and forensic analyses which have been presented throughout this chapter.

1. Burial Number
2. Shaft Position (upper, middle, or lower body within a shaft containing more than one individual.
3. Age (age determinations based or listed in historical documentation and/or historic records)
4. Osteological Age (age determinations based on osteological analysis)
5. Sex/Gender
6. Section of Potter's Field in which Burial/Body was recovered, if available
7. Comments (as to who this individual might be by name, race, or other historical information)
8. Pathologies Present (indicates that any type of pathology is present [bone, dental, soft tissue, etc]; this is a Yes or No entry)
9. Osteological Pathologies (indicates a pathology on the bone is present; another Yes or No entry)
10. Dental Pathologies (a Yes or No entry)
11. Caries (a subcategory of data from No. 10 – Dental Pathologies)
12. Abscesses (another subcategory of data from No. 10 – Dental Pathologies)
13. Periodontal Disease (another subcategory of data from No. 10 – Dental Pathologies)
14. Calculus (another subcategory of data from No. 10 – Dental Pathologies)
15. Alveolar Resorption (another subcategory of data from No. 10 – Dental Pathologies)
16. Severe Tooth Wear (another subcategory of data from No. 10 – Dental Pathologies)
17. Discoloration (another subcategory of data from No. 10 – Dental Pathologies)
18. Miscellaneous (another subcategory of data from No. 10 – Dental Pathologies; listing all remaining observed miscellaneous pathologies found on teeth)
19. Lesions
20. Developmental Pathologies
21. Evidence of Infectious Diseases
22. Evidence of Autopsy
23. Evidence of Amputation
24. Evidence of Osteoarthritis
25. Evidence of Severe Trauma
26. Fusion (which is evidence of two or more bones having grown or "fused" together)
27. Miscellaneous (a category for listing all observed miscellaneous pathologies found on the bones)
28. Photograph (was a photograph of the particular pathologies taken; another Yes or No category)
29. Completeness (how complete was the recovered skeletal remains – given in percentage complete)
30. Preservation Quality (how well the skeletal material was preserved – quality of preservation significantly effects the ability to conduct osteological and forensic analyses)
31. Stature (or estimated height of the individual)
32. Body Position (position of body in burial, such as extended, flexed, semi-flexed, indeterminate)
33. Coffin (if present, what type and shape of coffin)
34. Tissue (noting if soft tissue was present within a particular burial deposit)
35. Arm Position

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
1	a	42+	42+	male																	
10	a	42+	42+	male																	
25	a	50	45	female		yes	yes											lesions on parietals, ribs,clavicle, tibia		TB	
39	a	50<	50<	male																	
39	b	50	45	male		yes	yes	yes	caries					alveolar resorption				infection,periosteal reactive bone,clavicle			
46	b	35	33	male		yes	yes											periostitis tibia, periosteal reactive bone femur, lytic lesion on cranium	paget's (tibia's bowed)		
56	b	50	49	female		yes	yes														
62	a	50	50	male		yes	yes														
89	a	50	50+	male		yes	yes											infection,periostosis,femur			
90	b	50	50	male		yes		yes	caries									lesion,occipital			
126	a	50	50	male		yes	yes														
128	a	indet	indet	indet																	
155	a	40	35-45	male	Ernest Lea died 1930 Harrison	yes		yes	caries						cusps worn flat						
155	b	46	50+	male	Charles Devine died 1930 Hoboken	yes	yes	yes					mandible edentulous	alveolar resorption							
164	a	adult	adult	indet		yes	yes											infected foot			
164	b	35	35	male	afro american female	yes	yes												bowed femurs		
184	b	10	10	male																	
193	b	50+	50+	male		yes	yes											infection, right femur and right tibia			
195	c	fetus	fetus 4 months	indet																	
227	a	30	30	male	shoveling, possible Native American	yes		yes	caries												
253	b	50+	50+	male		yes	yes											lesion endocranial occipital and parietal			
255	b	20	20	male	metal lined coffin	yes	yes	yes	caries									endocranial lesions on frontal and parietals			
281	b	22	22	male		yes	yes	yes	caries									infection, frontal	spina bifida		autopsy cranium
282	c	51	51	male		yes		yes					mandible edentulous	alveolar resorption							
287	a	50	50	female	hit in head by hammer	yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				infection, humerus,tibia	spinabifidaatlas		
287	b	42	42	male		yes	yes	yes	caries										bowed left and right femurs		
287	c	1mo	.1	indet																	
297	a	55	50+	male	Charles Archonbeault died 1928 Jersey City																

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
1	a							25	poor	indet	extended	none	no	indet
10	a							25	poor	indet	indet	none	no	indet
25	a		osteoarthritisribs, femur, humerus, ulna, radius, scapula		sacroiliac joint ankylosed, ribs and verts fused, verts 7 thru 12 fused		photo	75	good	indet	extended	hexagonal	no	sides
39	a			fracture humerus				75	fair	indet	extended	hexagonal	no	abdomen
39	b			fracture clavicle				25	poor	indet	extended	hexagonal	no	abdomen
46	b		osteoarthritis on two vertebrae	fractures, cranium, left femur		pagets disease hare lip	photo	25	fair	163.036	extended	rectangular	no	chest
56	b			fracture			photo	25	good	indet	extended	rectangular	no	sides
62	a			fracture, fibula	distal tibia and fibula		photo	50	fair	171.366	extended	hexagonal	no	pelvis
89	a							75+	good	172.08	extended	rectangular	no	indet
90	b							75	good	161.05	extended	indet	no	sides
126	a	amputation, femur shaft					photo	25	poor	indet	extended	hexagonal	no	sides
128	a							50	poor	indet	extended	rectangular	no	indet
155	a							75	good	179.458	extended	rectangular	no	abdomen
155	b		osteoarthritis sacrum, calcaneous,		talus and navicular	osteoporosis	photo	75	good	178.506	extended	hexagonal	no	indet
164	a	amputation tibia and fibula and partial femur					photo	25	good	174.204	flexed	none	no	indet
164	b							75+	fair	164.94	extended	rectangular	no	pelvis
184	b							75	fair	indet	extended	hexagonal	no	indet
193	b			cut to distal femur			photo	25	fair	indet	extended	hexagonal	no	pelvis
195	c							25	poor	indet	indet	indet	no	indet
227	a						photo	50	fair	indet	flexed	indet	no	sides
253	b						photo	75+	fair	169.7	extended	rectangular	no	abdomen
255	b							75	good	165.654	extended	rectangular	yes	pelvis
281	b			fracture, clavicle			photo	75+	good	167.32	extended	rectangular	no	pelvis
282	c							75	fair	167.082	extended	hexagonal	no	abdomen
287	a		osteoarthritis	fracture, stellate of cranium, fracture of patella			photo	75	good	175.174	extended	rectangular	no	pelvis
287	b			non-union fracture on ulna blade fracture on frontal bone			photo	75	good	168.034	extended	rectangular	no	sides
287	c							indet	poor	indet	indet	indet	no	indet
297	a						photo	75	good	indet	extended	rectangular	no	indet

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
312	b	39	39	male																	
314	b	42	39	female	Alfoncina Pansini died 1928 Mental Disease Hospital	yes	yes														
343	a	2	1	female (by records)	female child																
344	a	50+	50+	female (possible)	amputated leg in child's coffin	yes	yes														
352	a	60	50+	male	Graham Chapin died 1926 Alms House																
356	b	3	2	indet																	
359	a	1.5	1.5	indet																	
368	b	59+	59+	male	possible back brace	yes		yes	caries	abscess											
418	b	54+	54+	male		yes	yes	yes			periodontal disease				cusps worn to dentine			Infection in maxilla			
418	c	fetus	fetus 7months	indet																	
421	a	50+	50+	male		yes	yes	yes	caries												
427	b	49	50	male	Angelo Di Nomo died 1930 TB Hospital	yes	yes	yes				calculus			cusps worn to dentine					TB by records	
430	b	22	22	male		yes	yes											endocranial lesions parietal, frontal			
434	a	33	33	male		yes	yes	yes	caries									lesion, cavitating on eye orbit and endocranial frontal, lytic lesions on femur	bowed femur		
434	b	45+	45+	indet		yes	yes	yes	caries	abscess							enamel hypoplasia	lesions, lytic on temporal, infection in elbow	cribra orbitalia, microcephalic		
437	b	35<	35<	male		yes	yes	yes	caries	abscess	periodontal disease	calculus			cusps worn to dentine		enamel hypoplasia	infection tibia, cloacae at manubrium, infection on clavicle			
438	b	39	39	male		yes	yes	yes	caries		periodontal disease										
439	a	59+	59+	male	European based on two rooted canine	yes	yes	yes	caries		periodontal disease							infection, femur			
448	a	37+	37+	female	Molly Borman died 1931 Asylum	yes	yes	yes	caries				mandible edentulous	alveolar resorption					cranial	osteoma, femur	
451	a	1.5	1.5	indet			yes											lytic lesion, endocranial frontal bone, left eye orbit		treponemal	
452	a	51	51	female		yes		yes					mandible and maxilla edentulous	alveolar resorption							
452	b	51	51	male		yes		yes	caries	abscess											
461	b	50+	50+	male		yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				infection both humerus, cloacae on amputated fibula		osteoma femoral head	
463	a	subadult	subadult	indet																	
472	a	12-17	12-17	indet		yes	yes												rickets, bowed femur		

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
312	b							75+	good	182.314	extended	rectangular	no	abdomen
314	b					osteoporosis chronic ear infection	photo	50	poor	159.416	extended	rectangular	no	indet
343	a							25	poor	indet	indet	indet	no	indet
344	a	amputated, leg	osteoarthritis of medial epicondyle	healed incomplete fracture of tibia			photo	75+	good	155.18	indet	tapering	no	indet
352	a						photo	75+	good	167.72	extended	hexagonal	no	sides
356	b							25	fair	64.98	extended	rectangular	no	abdomen
359	a							25	poor	indet	extended	hexagonal	no	indet
368	b							75+	good	180.41	extended	hexagonal	no	pelvis
418	b		osteoarthritis femur, sacrum, vertebrae		fused vertebrae	Osteoporosis , DISH	photo	75	good	173.389	extended	indet	no	abdomen
418	c							25	poor	indet	indet	indet	no	indet
421	a			fracture skull depression			photo	75	fair	indet	extended	rectangular	no	pelvis
427	b		osteoarthritis vertebrae,		left innominate fused to sacrum		photo	75	good	167.082	extended	indet	no	abdomen
430	b						photo	75	fair	158.514	extended	indet	no	abdomen
434	a		osteoarthritis, scapula				photo	75+	excel	162.798	extended	rectangular	no	pelvis
434	b		osteoarthritis of shoulder				photo	50	fair	157.324	extended	hexagonal	no	abdomen
437	b	amputation midshaft tibia	osteoarthritis calcaneous		manubrio costal fusion		photo	75	good	175.65	extended	hexagonal	no	pelvis
438	b		osteoarthritis, femur, humerus, ulna, vertebrae	fracture dented fibula				75+	excel	170.652	extended	indet	no	abdomen
439	a		osteoarthritis of cervical and thoracic verts				photo	75+	good	166.13	extended	rectangular	no	pelvis
448	a			fracture, humerus depression				75+	good	158.276	flexed	rectangular	no	pelvis
451	a						photo	50	fair	105.47	extended	hexagonal	no	indet
452	a							75	good	153.516	extended	hexagonal	no	pelvis
452	b							75+	good	183.742	extended	hexagonal	no	chest
461	b	amputation midshaft tibia and fibula	osteoarthritis ulna, vertebrae, right hand				photo	75+	excel	175.65	extended	hexagonal	no	abdomen
463	a							25	poor	indet	indet	hexagonal	no	indet
472	a						photo	25	poor	indet	extended	tapering	no	indet

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
541	c	stillborn	stillborn	indet	still born died 1934 Jersey City																
546	c	fetus	fetus	indet																	
570	b	50+	50+	male		yes	yes											infection of tibia and fibula, radius, rib			
574	a	63+	63+	male		yes	yes											lytic lesions on sacrum sclerotic margin	bowed fibula Paget's disease, partial spina bifida developmental		
575	a	63+	63+	male		yes	yes	yes			periodontal disease				cusps worn to dentine			infection, calcaneous, metatarsal, cloaca,tibia, fibula	spina bifida partial		
577	a	42	50+	male	John Keskanicz died 1931 Jersey City	yes	yes														autopsy cranial
589	d	fetus	fetus 8 months	indet																	
590	a	50	49	male	Fred Lehman died 1933 Union City	yes	yes	yes			periodontal disease								developmental, cranial		
590	b	65+	65+	female	Ida Smith died 1932 Asylum	yes	yes	yes					mandible and maxilla edentulous	alveolar resorption							
591	a	adult	adult	indet	cremation, buried 1932																
602	c	fetus	fetus 5 months	indet																	
608	c	fetus	fetus	indet	unknown died 1939																
608	d	fetus	f	indet																	
614	a	16	16	indet		yes	yes											infection and lytic lesions on tibia			
614	c	fetus	fetus	indet																	
616	c	1 month	fetus 8 months	indet	Hamet Denning died 1931 Hoboken																
617	b	45-50	45-50	male		yes	yes	yes	caries						cusps worn to dentine			soft tissue tumors on parietal, lesions on neck of femur, clavicle; infection on clavicle			
617	c	.6	.6	indet																	
622	b	45	43	male	in same coffin as female adult, William Reddick died 1937 Asylum	yes	yes	yes			periodontal disease								spina bifida-partial, craniostenosis	staphylococcal or mycotic infection	
625	a	54	54	male																	
630	a	64	64	male		yes	yes	yes			periodontal disease							infection femur			
632	b	21+	21+	male	ear infection		yes											lesion, occipital, mastoid, temporal			
633	b	60+	60+	male		yes	yes	yes		abscess	periodontal disease						mandibular torus	lytic lesion of left frontal			
635	b	65+	65+	male		yes	yes	yes			periodontal disease							infection, left femur, left patella, lesions lumbar		osteocarcinoma, pelvis	

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
541	c							25	poor	indet	indet	indet	no	indet
546	c							25	poor	indet	indet	indet	no	indet
570	b		osteoarthritis, cervical, thoracic, lumbar verts	rib- dislocated toe; schmorls node on lumbars	sacrum and lumbar sacralized		photo	75+	good	170.176	extended	hexagonal	no	abdomen
574	a		osteoarthritis, tibia, fibula, radius, vertebrae		fused		photo	75+	excel	172.556	extended	hexagonal	no	pelvis
575	a		osteoarthritis femur, carpal phalanges	fracture, fibula			photo	75+	good	175.412	extended	hexagonal	no	pelvis
577	a		osteoarthritis of tibia, verts			osteoporosis	photo	75	fair	172.09	extended	rectangular	no	abdomen
589	d							25	poor	indet	indet	indet	no	indet
590	a							75	fair	168.034	extended	hexagonal	no	chest
590	b					osteoporosis		50	poor	indet	extended	hexagonal	no	pelvis
591	a					cremation	photo	50	poor	indet	disarticulated	rectangular	no	indet
602	c							25	poor	indet	indet	none	no	indet
608	c							25	poor	indet	indet	none	no	indet
608	d							25	poor	indet	indet	none	no	indet
614	a	amputated leg at distal femur					photo	25	good	indet	indet	indet	no	indet
614	c							25	poor	indet	indet	rectangular	no	indet
616	c							25	poor	indet	indet	indet	no	indet
617	b		osteoarthritis ulna, vertebrae, sacrum		fused vertebrae, sacrum is fused to left and right ilium		photo	75	good	176.84	extended	hexagonal	no	pelvis
617	c							25	poor	indet	indet	indet	no	indet
622	b			node, depression femur; myositis ossificans traumatica femur, healed fracture	fused vertebrae		photo	75+	excel	184.932	extended	hexagonal	no	abdomen
625	a		osteoarthritis, scapula	fracture, depression to frontal			photo	75+	excel	182.076	extended	hexagonal	no	sides
630	a		osteoarthritis, cervical, thoracic verts	fracture femur	fused thoracic vertebrae.		photo	25	good	166.13	extended	hexagonal	no	abdomen
632	b						photo	25	poor	indet	extended	tapering	no	indet
633	b		osteoarthritis, sacrum,vertebrae	fracture, cut through supra orbital border, tibia, fibula	fused		photo	75	good	166.84	extended	hexagonal	no	pelvis
635	b		cervical vertebrae, foot	fracture, metal bands right femur, depression tibia	fused, cervical verts		photo	75	good	168.986	extended	hexagonal	no	pelvis

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
646	b	63+	63+	male		yes	yes	yes	caries			calculus						lesion, possible TB of S1		TB?	
648	a	51	51	male	TMJ	yes	yes	yes									TMJ	lesion	developmental		
651	b	50	50	male		yes	yes	yes					mandible edentulous	alveolar resorption			impacted premolar	lytic lesion on S2, infection femur, fibula	spina bifida- partial, congenital deformation of upper shaft of both femur (twisted		
657	a	35	35	male																	
657	b	adult	adult	female		yes	yes											osteomyelitis of left humeral head cloaca			
666	a	adult	adult	indet		yes	yes											infection, cloaca-osteomyelitis on fibula and cancaneous.			
668	c	fetus	fetus 8 months	indet																	
679	b	13	13	female	afro american child																
683	a	38+	38+	male		yes	yes											lytic lesions, frontal and parietal	microcephalic skull		
687	a	50+	50+	indet		yes	yes														
687	b	54	54	female		yes	yes											infection of tibia	scoliosis, kyphosis		
689	a	51	51	female		yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				infection clavicle	craniostenosis		autopsy cranial
690	b	39	39	male		yes	yes	yes	caries									infection, acetabulum; lesion, rib, sacrum			
697	a	45	45	male		yes	yes	yes	caries		periodontal disease						gold bridge	infection, tibia, fibula	spina bifida, spondylolysis		
698	a	53	53	male		yes	yes	yes	caries						severe tooth wear			cribra orbitalia			
712	a	60+	60+	female		yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				infection, tibia			
714	c	fetus	fetus 5 months	indet																	
733	c	subadult	subadult	indet																	
739	a	42	42	male		yes	yes	yes	caries		periodontal disease							periosteal infection			
749	a	50	50	male	one deformed innominate and leg	yes	yes	yes	caries									infection	innominate and leg much shorter than other and		
781	a	30-34	30-34	female	stocking lady	yes	yes											cribra orbitalia, lytic lesions osteomyelitis frontal bone			
781	c	51	51	male		yes	yes											infection		TB	
791	a	adult	adult	indet		yes	yes											lytic lesion of calcaneous, patella, tibia			
791	b	63+	63+	male		yes	yes	yes	caries				mandible edentulous	alveolar resorption				osteoma on femoral head, infection on femur and tibia			
792	c	fetus	fetus	indet																	

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
646	b		osteoarthritis sacrum, radius, scapula, vertebrae calcaneous	Schmorl's node, compound fracture of femur	metatarsal and phalange		photo	75+	good	167.32	extended	hexagonal	no	abdomen
648	a		osteoarthritis		fused	cerebral palsy (possible)	photo	75+	excel	180.88	extended	rectangular	yes	sides
651	b		osteoarthritis, ulna, radius, vertebrate	Schmorl's node, compound fracture of femur	tibia & fibula fused distally	osteoporosis, scapula	photo	75+	good	172.794	extended	hexagonal	yes	sides
657	a							25	fair	indet	extended	indet	no	indet
657	b		osteoarthritis scapula, clavicle, vertebrae	fracture at head of humerus	vertebrae C2-C3 and C5-C6			25	fair	indet	extended	indet	no	indet
666	a	amputated (disarticulation) of fibula and tibia at knee					photo	25	good	162.604	extended	indet	no	indet
668	c							25	poor	indet	indet	indet	no	indet
679	b						photo	75	good	159.77	extended	tapering	no	pelvis
683	a							25	poor	indet	extended	indet	no	sides
687	a				fused	kyphosis, scoliosis	photo	75	good	indet	extended	hexagonal	no	pelvis
687	b		osteoarthritis pelvis,scapula, ulna	fracture femur, rib	ankylosis of sacrum and thoracic and lumbar verts		photo	75	good	158.58	extended	hexagonal	no	pelvis
689	a		DISH	metacarpal, dislocated shoulder,	fused cervical vertebrae		photo	75+	fair	153.39	extended	hexagonal	no	indet
690	b	amputation	osteoarthritis of vertebrae	fracture-compression of L2, schmorl's node	fused thoracic vertebrae	DISH	photo	75	good	168.034	extended	hexagonal	no	pelvis
697	a		osteoarthritis, humerus, verts, femur	fracture femur	fused		photo	75+	good	178.268	extended	indet	no	pelvis
698	a		osteoarthritis				photo	75+	fair	173.03	extended	rectangular	yes	pelvis
712	a		osteoarthritis, axis, tarsal			osteoporosis	photo	75	good	181.6	extended	hexagonal	no	abdomen
714	c							25	poor	indet	indet	indet	no	indet
733	c							25	poor	indet	indet	indet	no	indet
739	a		osteoarthritis	cranial blunt force trauma, Schmorl's node			photo	75	fair	157.562	extended	hexagonal	no	abdomen
749	a		osteoarthritis right hand				photo	50	fair	162.798	extended	hexagonal	no	sides
781	a						photo	50	fair	158.087	extended	rectangular	no	pelvis
781	c		osteoarthritis		fused vertebrae		photo	75	good	166.13	extended	indet	no	abdomen
791	a	amputated leg at midshaft of femur					photo	25	good	162.37	indet	none	no	pelvis
791	b		osteoarthritis, verts, DISH	fracture femur	fused vertebrae	DISH osteoporosis		75	good	183.98	extended	rectangular	no	pelvis
792	c							25	poor	indet	indet	indet	no	indet

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
793	a	44	44	female	zsa zsa	yes	yes	yes					mandible and maxilla edentulous	alveolar resorption					cerebral palsy, rickets/bowing		
797	b	fetus	fetus	indet																	
830	a	50	50	male		yes	yes														
830	b	54	54	male		yes	yes														
837	b	fetus	fetal 9 mos	indet																	
863	a	3.5	3.5	indet																	
880	b	51-54	51-54	female		yes	yes	yes	caries			calculus						infection fibula, tibia			
881	a	50+	50+	male	autopsy non union of fracture	yes	yes	yes	caries		periodontal disease										autopsy, cranial
902	a	59+	59+	male	gold bridge maxilla	yes	yes	yes									gold bridge-maxilla	osteomyletis of fibula, humerus (cloaca), lytic lesion endocranial parietal			
902	b	42	42	male		yes	yes	yes	caries	abscess	periodontal disease	calculus			cusps worn to dentine			infection, tibia periosteal reactive bone, mandible			
935	a	79	64+	male	Daniel Smith died 1949 Mental Disease Hospital	yes	yes	yes	caries						cusps worn flat						
935	b	54	51	male	Leonardo Andriani died 1948 Mental Disease Hospital	yes	yes	yes	caries	abscess	periodontal disease			alveolar resorption				lesions endocranial			autopsy
940	b	35	35	male		yes	yes	yes	caries									lesions endocranial frontal			autopsy cranial
941	b	42	42	female		yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				infection femur, humerus osteomyelitis, cloaca, Chondro Blastoma, lytic lesions endocranial-aneurisms	degenerative joint disease of distal humerus		
944	b	50+	50+	female		yes	yes	yes					mandible edentulous					lesion			
950	a	adult	adult	indet	amputated leg in formal baby coffin	yes	yes											lytic lesions on head of fibula			
951	a	50	50	male		yes	yes	yes	caries		periodontal disease							osteomyletis of humerus and fibula, endocranial lesions, cloaca in right femur			
952	a	60+	60+	female		yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				infection in ulna, rusty nail embedded in femur, osteomyletis, tetanus			
959	a	stillborn	stillborn	indet																	
980	a	4	4	indet		yes		yes	caries												
981	a	5	5	indet																	
982	a	4	4	indet																	
983	a	3	3	indet																	
984	a	2	2	indet																	
999	a	60+	60+	female		yes	yes	yes	caries	abscess								lytic lesions on endo frontal and endo occipital			

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
793	a		osteoarthritis			cerebral palsy	photo	75	good	indet	extended	indet	no	pelvis
797	b							25	poor	indet	indet	indet	no	indet
830	a		osteoarthritis vertebrae,					50	good	170.89	ex	hexagonal	no	indet
830	b		scapula, sacrum, patella, vertebrae, pelvis, carpal phalanges, talus		fused thoracic vertebrae			75	good	182.314	extended	hexagonal	no	pelvis
837	b							25	poor	indet	indet	indet	no	indet
863	a							25	poor	indet	indet	indet	no	indet
880	b		osteoarthritis, verts, sacrum		fused		photo	50	fair	180.79	extended	hexagonal	no	abdomen
881	a		osteoarthritis shoulder, elbow, hip, vertebrae	fracture, radius, ulna			photo	75	good	170.652	extended	indet	no	sides
902	a		osteoarthritis in glenoid	dislocation of humerus/scapula	fused	osteoporosis	photo	75	fair	179.696	extended	indet	no	pelvis
902	b		osteoarthritis shoulder, ulna, radius, clavicle, vertebrae, metatarsal	fracture			photo	75+	good	166.13	extended	indet	no	pelvis
935	a		right humerus, left and right ulna, scapula, vertebrae especially				photo	75	good	172.08	extended	tapering	no	sides
935	b		osteoarthritris, clavicle, hip, foot	dislocated clavicle, Schmorl's nodes			photo	75+	good	184.456	extended	indet	no	abdomen
940	b		osteoarthritis sacrum		fused vertebrae		photo	75	good	165.89	extended	indet	no	sides
941	b		osteoarthritis, scapula. Rheumatoid arthritis of left elbow		fusion- ankylosis of distal humerus with proximal ulna and radius		photo	75	good	153.992	extended	indet	no	abdomen
944	b							25	poor	indet	indet	indet	no	indet
950	a	amputation, disarticulation at knee					photo	25	good	indet	extended	hexagonal	no	indet
951	a			fracture, healed compression of right femur			photo	50	fair	166.546	extended	indet	no	chest
952	a		osteoarthritis	trauma		osteoporosis		75	good	155.659	extended	rectangular	no	pelvis
959	a							25	fair	indet	indet	indet	no	indet
980	a							25	poor	indet	indet	indet	no	indet
981	a							25	poor	indet	extended	indet	no	sides
982	a							25	fair	indet	extended	indet	no	indet
983	a							25	poor	indet	extended	indet	no	indet
984	a							25	poor	indet	extended	rectangular	no	indet
999	a			dislocation of clavicle	fused axis to C3	mass	photo	75+	good	164.015	extended	rectangular	no	abdomen

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
1000	b	51	51	male	ZieglarCoffin	yes	yes	yes	caries		periodontal disease			alveolar resorption							
1006	b	38	38	female		yes	yes	yes		abscess			mandible edentulous	alveolar resorption		black staining on teeth	enamel hypoplasia	lesion, endocranial due to ear infection and strepococcic meningitis, menlignioms in left eye orbit, cloaca, osteomyelitis in mastoid	spondylolysis of atlas		autopsy of cranium
1014	b	63+	63+	male		yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				infection in scapula, humerus			
1020	b	51	51	male	Train Wreck	yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				lytic lesions, parietals , DISH of endocranial frontal			autopsy of cranium
1036	b	70+	70+	male		yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				lesion, myositis ossificans, osteomyletis- tibia and fibula			
1037	c	fetus	fetal 5 months	indet																	
1052	c	35	35	female																	
1052	d	42	42	male																	
1053	a	22	29<	female	Unknown woman died 1903 Jersey City																
1053	b	68	adult	male	Thomas Devaney died 1903 Almshouse																
1055	a	40	50+	male	Unknown Man died 1905 Jersey City	yes	yes	yes			periodontal disease										
1055	b	33	33	male		yes	yes	yes			periodontal disease						enamel hypoplasia				
1059	b	50	50	male		yes		yes	caries												
1086	a	fetus	fetal 6months	indet																	
1097	a	35	35	male	Unknown Man died 1905 Jersey City																
1097	b	53	35-45	male	Edward C. Routh died 1905 Jerey City	yes		yes	caries												
1100	a	30	30	male	Patric Kenny died 1897 Jersey City	yes		yes	caries												
1120	a	29	21-35	male	James J. Jacobs died 1907 Jersey City																
1120	b	52	49	male	John Allen died 1907 Jersey City	yes		yes	caries						cusps worn to dentine						
1135	a	55	adult	male	John Billingley died 1905 Jersey City																
1135	b	48	40	male	Unknown Man died 1905 Jersey City																
1136	a	50	35	male	James Glane ? died 1905 Jersey City																
1140	a	77	50+	male	Bernard Lewakowski died 1905 Jersey City																
1140	b	40	50<	male	Unknown Man died 1905 Jersey City																
1143	a	21	35<	male	John Curtis died 1908 Jersey City																

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
1000	b		osteoarthritis	fracture unhealed ribs			photo	100	excel	174.246	extended	rectangular	yes	pelvis
1006	b			fracture acromion, ulna	Ankylosis of axis thru C7, L5 and L6 sacralized (fused to sacrum fused and dislocated 3rd right tarsal phalange	osteoporosis	photo	25	fair	150.37	indet	tapering	no	
1014	b		osteoarthritis, sacrum, pelvis, vertebrae	dislocated shoulder			photo	75+	good	163.274	extended	hexagonal	no	abdomen
1020	b		osteoarthritis, scapula, vertebrae, calcaneous	fracture, right & left scapula, right clavicle, 5 ribs, Atlas, schmorl's node, right humerus, left ulna, left radius, right ulna, right fibula, right tibia, right femur, left femur.			photo	75	fair	176.71	extended	rectangular	no	sides
1036	b		osteoarthritis, femur; sacrum, verts	fracture-sternum, rib		DISH. Osteoporosis	photo	75+	good	186.836	extended	indet	no	pelvis
1037	c							25	fair					
1052	c							75	good	indet	extended	hexagonal	no	pelvis
1052	d							75	fair	167.162	extended	indet	no	chest
1053	a							25	fair	indet	extended	indet	no	indet
1053	b							25	fair	indet	extended	indet	no	sides
1055	a			fracture humerus		osteoporosis		50	fair	168.178	extended	indet	no	sides
1055	b							50	poor	165.006	extended	indet	no	pelvis
1059	b						photo	75	poor	indet	extended	indet	no	indet
1086	a							25	fair	indet	indet	indet	no	indet
1097	a							25	poor	indet	extended	indet	no	indet
1097	b							25	poor	indet	extended	indet	no	indet
1100	a							50	fair	indet	extended	hexagonal	no	sides
1120	a							50	poor	indet	extended	indet	no	abdomen
1120	b							75	fair	163.75	extended	indet	no	sides
1135	a							25	poor	indet	extended	indet	no	indet
1135	b							25	poor	162.08	extended	indet	no	abdomen
1136	a							50	poor	indet	extended	hexagonal	no	pelvis
1140	a							25	poor	indet	extended	indet	no	indet
1140	b							25	fair	indet	extended	rectangular	no	indet
1143	a							25	poor	indet	extended	indet	no	indet

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
1146	a	45	35	male	Charles Miller died 1905 Jersey City																
1146	b	28	21-25	male	Horace Gore died 1905 Jersey City	yes		yes	caries												
1147	a	37	35	male	Joseph Doyle died 1905 Jersey City	yes		yes	caries		periodontal disease	calculus									
1147	b	26	27	male	Josepi Mauzio died 1905 Jersey City	yes		yes	caries												
10011	a	fetus	fetus 5 months	indet	fetus in jar																
11008	a	indet	indet	indet	parafin and fatty acid	yes		yes													
11078	a	26+	26+	indet																	
11103	a	subadult	subadult	indet																	
11116	a	3<	3<	indet																	
11119	a	3<	3<	indet																	
11120	a	3<	3<	indet																	
11120	b	3<	3<	indet																	
11130	a	birth	birth	indet																	
11130	b	.9	.9	indet																	
11151	b	50	50	male																	
11157	a	2	2	indet																	
11157	b	adult	adult	indet																	
11193	a	42+	42+	male																	
11197	b	2.5	2.5	indet																	
11203	a	31	26	male	George Smith died 1899 County Hospital																
11222	b	60	50	male	unknown man died 1901 Jersey City	yes	yes	yes	caries									endocranial lesion frontal bone			
11236	a	50	50	female		yes	yes	yes		abscess								infection	developmental		
11276	a	71	60+	female	Afro-American Mary Anderson died 1899 Jersey City	yes		yes					mandible and maxilla edentulous	alveolar resorption							
11277	a	3	3	indet																	
11319	a	5.5	5.5	indet																	
11330	a	5	5	indet		yes	yes											porotic hyperostosis orbits			
11346	a	adult	adult	male		yes	yes												cribra orbitalia		
11358	a	47	42+	male	Joseph Metzger died 1896 Jersey City	yes		yes	caries												
11377	a	30's	27-31	male	Charles Greenwald died 1895 Jersey City 3_																
11426	a	subadult	subadult	indet																	
11427	a	subadult	subadult	indet																	
11429	a	50	50+	male	Unknown man died 1898 Jersey City	yes		yes					maxilla edentulous	alveolar resorption							
11470	a	65	50	male	James Doran died 1914 Jersey City	yes	yes	yes									enamel hypoplasia		synostosis		

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
1146	a							50	fair	indet	extended	indet	no	indet
1146	b							75	good	indet	extended	indet	no	abdomen
1147	a							75	fair	indet	extended	hexagonal	no	sides
1147	b							75	fair	162.56	extended	hexagonal	no	pelvis
10011	a						photo	100	excel	indet	flexed	jar	yes	n/a
11008	a							25	poor	indet	indet	hexagonal	yes	
11078	a							25	poor	indet	indet	indet	no	indet
11103	a							25	poor	indet	extended	rectangular	no	indet
11116	a							25	poor	indet	extended	indet	no	indet
11119	a							25	poor	indet	indet	rectangular	no	indet
11120	a							25	poor	indet	indet	indet	no	indet
11120	b							25	poor	indet	indet	indet	no	indet
11130	a							25	poor	indet	indet	indet	no	indet
11130	b							25	poor	indet	indet	indet	no	indet
11151	b							50	fair	indet	extended	indet	yes	indet
11157	a							25	poor	indet	indet	indet	no	indet
11157	b							50	fair	indet	extended	rectangular	yes	sides
11193	a							25	poor	indet	extended	indet	no	indet
11197	b							25	poor	indet	extended*	indet	no	sides
11203	a							75	fair	165.622	legs disarticulated	hexagonal	no	chest
11222	b							75	fair	indet	extended	tapering	no	abdomen
11236	a						photo	75	good	160.894	extended	hexagonal	no	abdomen
11276	a							50	poor	indet	extended	none	no	pelvis
11277	a							25	poor	indet	extended	rectangular	no	chest
11319	a							25	poor	indet	indet	indet	no	indet
11330	a						photo	25	poor	indet	extended	indet	no	indet
11346	a							50	poor	indet	extended	indet	no	sides
11358	a							75	fair	155.18	extended	indet	no	sides
11377	a							50	poor					
11426	a							25	poor	indet	indet	hexagonal	no	indet
11427	a							25	poor	indet	indet	tapering	no	indet
11429	a							75	fair	indet	extended	indet	no	indet
11470	a						photo	75	good	170.414	extended	hexagonal	no	sides

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
11482	a	68	50+	male	John Armstrong died 1902 Jersey City	yes	yes														
11482	b	70	50+	male	Henry Rolle died 1902 Jersey City																
11484	a	38	33+	female	Lena Bonner died 1903 Jersey City: carabelli's cusp												carabelli's cusp				
11486	a	35	40	male	Unknown Man died 1904 Hoboken	yes		yes							cusps worn flat						
11486	b	40	25	male	Giovanni Nobletti died 1904 Hoboken	yes		yes	caries												
11488	a	35	35	female		yes		yes	caries												
11496	a	2-3 months	2-3 months	indet																	
11496	b	26+	26+	male		yes	yes	yes	caries								enamel hypoplasia	lytic lesions endocranial			autopsy, cranial
11518	a	56	50+	male	Charles Shutte died 1895 place unknown																
11529	a	3.5	3.5	indet		yes	yes												cribra orbitalia		
11529	b	subadult	subadult	indet		yes	yes												cribra orbitalia		
11552	a	12	12	indet	possible Native American, edge to edge bite	yes		yes	caries		periodontal disease										
11556	a	7-8	7-8	indet		yes		yes	caries								enamel hypoplasia				
11557	a	46	33+	male	Oser Mayer died 1896 Jersey City																
11564	a	30	30	female																	
11569	a	31	25-35	female	possible Native American, Dora Manning died 1897 Jersey City	yes	yes														autopsy
11576	a	40	35	male	Ishmal Sammoses died 1897 Jersey City																
11576	b	.1	.1	female	Mary Brown died 1897 almshouse																
11587	a	adult	adult	indet																	
11591	a	18	adult	female	Rocher Menger died 1905 Jersey City																
11596	a	2-4	2-4	indet																	
11605	a	12	12	indet		yes	yes												cribra orbitalia		
11639	a	50+	50+	indet																	
11649	a	51	45	male	Daniel Nevins died 1904 Jersey City	yes		yes							cusps worn to dentine						
11649	b	53	50-54	male	Robert J. Cameron died 1904 Jersey City	cusps worn and polished									cusps worn and polished						
11657	a	50+	50+	male																	
11657	b	35<	35<	male		yes		yes									enamel hypoplasia				
15007	a	46	44	indet	Robert Willis died 1916 Hoboken																
15010	a	50	50+	male	Unknown Man died 1916 Jersey City	yes		yes					maxilla edentulous	alveolar resorption			enamel hypoplasia				
15018	d	5	5	indet																	

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
11482	a					osteoporosis		50	fair	indet	extended	indet	no	pelvis
11482	b							25	poor	indet	extended	indet	no	indet
11484	a							50	fair	indet	extended	hexagonal	no	pelvis
11486	a							50	fair	176.84	extended	indet	no	sides
11486	b						photo	75+	good	171.6	extended	indet	no	sides
11488	a							50	fair	indet	extended	hexagonal	no	sides
11496	a							25	poor	indet	indet	indet	no	indet
11496	b							50	poor	137.332	extended	indet	no	pelvis
11518	a							50	poor	177.634	extended	indet	no	sides
11529	a							25	poor	indet	extended	indet	no	indet
11529	b							25	poor	indet	extended	indet	no	indet
11552	a						photo	25	poor	indet	extended	indet	no	sides
11556	a						photo	25	poor	indet	extended	indet	no	indet
11557	a							75	poor	indet	extended	indet	no	chest
11564	a							25	poor	indet	extended	indet	no	abdomen
11569	a							50	fair	171.166	extended	hexagonal	no	sides
11576	a							75	good	168.986	extended	tapering	no	pelvis
11576	b							25	poor	indet	indet	indet	no	
11587	a							50	fair	indet	extended	indet	no	chest
11591	a							50	poor	indet	extended	indet	no	sides
11596	a							25	poor	indet	indet	indet	no	indet
11605	a				fused atlas/axis			25	poor	indet	indet	hexagonal	no	indet
11639	a							25	poor	indet	extended	indet	no	indet
11649	a							25	fair	indet	extended	indet	no	pelvis
11649	b							25	fair	indet	extended	indet	no	sides
11657	a							25	poor	indet	extended	indet	no	
11657	b							50	fair	167.61	indet	indet	no	
15007	a							25	poor	indet	extended	indet	no	indet
15010	a							25	poor	indet	extended	indet	no	chest
15018	d							25	poor	indet	indet	indet	no	indet

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
15020	a	62	adult	male	Robert Wagner died 1915 Hoboken	yes		yes	caries		periodontal disease	calculus			cusps worn to dentine						
15020	b	38	35	male	Antonio Vitale died 1915 Almshouse																
15021	a	indet	indet	indet																	
15021	b	indet	indet	indet																	
15027	b	64	51	female	Bridget Mooney died 1897 Jersey City																
15035	a	40	38+	male	Unidentified Male Adult died 1925 Jersey City	yes		yes	caries		periodontal disease						impacted tooth				
15035	b	50	35	male	Paul Merrett died 1925 Jersey City	yes		yes	caries												
15039	a	50	54	male	Alfred Campbell died 1916 Jersey City	yes		yes						alveolar resorption							
15039	b	55	54	male	William Trattes died 1916 Jersey City	yes		yes	caries		periodontal disease										
15039	c	subadult	subadult	male	male child died 1916 Jersey City																
15041	a	23	29<	male	Henry Knie died 1916 Tuberculosis Hospital	yes	yes	yes	caries											TB by historic records	
15041	b	7-8	7-8	indet																	
15050	a	35	35<	male	unknown man (Murphy) died 1915 Jersey City																
15050	b	60	50+	male	Paul Bekowski died 1915 Jersey City	yes	yes											lesion on clavicle		TB, confirmed by historic records	
15059	a	70+	70+	male																	
15059	b	32	21-35	male	Unknown Man died 1915 Hoboken	yes		yes	caries												
15067	a	30	21-35	male	Unknown man died 1903 Hoboken																
15067	b	28	29<	male	Angelo Senaco died 1903 Jersey City	yes	yes	yes					mandible and maxilla edentulous	alveolar resorption				osteophytic growth on anterior crest of tibia due to trauma, mastoid infected			
15069	b	60	50+	male	Englebrecht Nelson died 1916 Tuberculosis Hospital	yes	yes	yes							cusps worn to dentine			lesion endocranial parietal		TB confirmed by Historic Records	
15075	b	50	50	male	Unknown man died 1915 Jersey City	yes	yes	yes	caries												autopsy
15080	a	65	50	male	Hugo Weiner died 1915 Jersey City	yes		yes						alveolar resorption	cusps worn to dentine						
15080	b	22-34	22-34	female		yes	yes	yes		abscess								lesion endocranial			
15083	a	29	29+	male	John Discup died 1914 Tuberculosis Hospital	yes	yes													TB hospital-poor condition no osteological evidence observed	
15083	b	29	42	male	Max Benhard died 1914 Tuberculosis Hospital	yes	yes	yes					mandible and maxilla edentulous	alveolar resorption						TB hospital-poor condition no osteological evidence observed	
15111	a	44	35+	male	Charles Hessler died 1907 Jersey City	yes		yes								black staining					
15128	a	.9	.9	indet																	

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
15020	a							50	fair	indet	extended	indet	no	pelvis
15020	b							75	poor	indet	extended	indet	no	chest
15021	a							25	poor	indet	extended	indet	no	sides
15021	b							50	poor	indet	extended	indet	no	indet
15027	b							50	poor	indet	extended	indet	no	indet
15035	a							75	poor	indet	extended	indet	no	sides
15035	b							50	poor	indet	extended	indet	no	indet
15039	a							50	fair	175.65	extended	indet	no	abdomen
15039	b							50	poor	165.654	extended	rectangular	no	sides
15039	c							25	poor	indet	indet	indet	no	indet
15041	a							25	poor	indet	extended	indet	no	sides
15041	b							25	poor	indet	indet	indet	no	indet
15050	a							25	poor	indet	extended	hexagonal	no	sides
15050	b					osteoporosis		50	fair	165.416	extended	indet	no	sides
15059	a						photo	50	poor	160.98	extended	indet	no	chest
15059	b							50	poor	160.89	extended	indet	no	abdomen
15067	a							75	poor	174.55	extended	hexagonal	no	abdomen
15067	b			trauma to tibia (blow)				75+	fair	169.938	extended	rectangular	no	abdomen
15069	b						photo	50	fair	indet	extended	hexagonal	no	pelvis
15075	b			fracture, femur and tibia			photo	50	poor	172.09	extended	indet	no	sides
15080	a							75	poor	indet	extended	rectangular	no	pelvis
15080	b							75	poor	163.048	extended	rectangular	no	sides
15083	a							25	fair	indet	extended	hexagonal	no	indet
15083	b					osteoporosis, metal rod in spine		75	fair	indet	extended	indet	no	pelvis
15111	a							50	poor	indet	extended	indet	no	pelvis
15128	a							25	poor	indet	extended	rectangular	no	sides

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
15131	a	50	adult	male	Michael Scully died 1905 Jersey City																
15149	a	unk in records	30<	male	Unknown man died 1906 Jersey City																
15151	b	15	15	female		yes		yes								black staining					
15162	a	27	21-35	male	John Busick died 1905 Jersey City	yes		yes	caries												
15162	b	adult	adult	male	Henry Stewart died 1905 Jersey City																
15170	a	adult	adult	male																	
15170	b	subadult	subadult	female																	
15172	a	unk in records	35<	male	Joseph Honerson died 1904 Asylum																
15172	b	54	50+	male	Edward Booth died 1904 Jersey City																
15182	b	.6	.6	indet																	
15190	a	45	adult	male	Unknown man died 1906 Hoboken																
15190	b	36	adult	male	William E. James died 1906 Jersey City																
15193	a	45	40-45	male	Unknown man died 1913 Jersey City	yes	yes	yes	caries								enamel hypoplasia	lytic lesion of femoral head			
15193	b	36	39	male	Anthony Kawaski died 1913 Jersey City	yes		yes				calculus			cusps worn smooth						
15196	a	21	21-34	male	Vittorio Martinelli died 1913 Hoboken	yes	yes	yes									hypoplasia, crowns malformed	lesions, endocranial		syphillis, congential	
15201	a	21<	21<	male		yes		yes	caries												
15201b	b	50+	50+	male		cusps worn to dentine									cusps worn to dentine						
15214	a	60+	60+	male		yes		yes					mandible and maxilla edentulous	alveolar resorption							
15214	b	44	44	male		yes	yes	yes	caries			calculus			cusps worn smooth			lytic lesion along menengeal artery (ear infection)			
15216	c	stillborn	stillborn 8.75months	indet	Still birth of Josie Ostrifika died 1913																
15219	a	63+	63+	male		yes	yes	yes						alveolar resorption				lesions along menengeal artery- chronic ear infections			
15219	b	44	44	male		yes		yes	caries	abscess	periodontal disease										
15221	a	43	39	male	Fabri Casare died 1913 Hoboken	yes	yes											lytic lesion along menengeal artery (ear infection); cribra orbitalia			
15221	b	42	42	male	John Nelson died 1913 Hoboken	yes	yes	yes				calculus		alveolar resorption	cusps worn flat			lesion-eye orbit, soft tissue tumor; infection femur			
15229	c	1.5	1.5	indet																	
15231	a	41	42	male	Steven Roberts died 1913 Tuberculosis Hospital	yes	yes											endocranial lesions temporal, reactive bone endocranial frontal		TB confirmed by Historic Records	
15231	b	30	35	male	Unknown man died 1913 Jersey City	yes	yes	yes	caries			calculus			cusps worn smooth			lesion, soft tissue tumor eye orbit			
15238	a	3	3	indet	mongoloid/shovelshaped incisors	yes		yes	caries												

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
15131	a							25	poor	indet	extended	indet	no	sides
15149	a							50	poor	indet	extended	indet	no	indet
15151	b							50	poor	indet	extended	indet	no	sides
15162	a						photo	50	fair	indet	extended	hexagonal	no	pelvis
15162	b							25	poor	indet	extended	hexagonal	no	pelvis
15170	a							25	poor	indet	indet	indet	no	pelvis
15170	b							50	poor	indet	extended	rectangular	no	indet
15172	a							75	poor	indet	extended	hexagonal	no	pelvis
15172	b						photo	75	poor	indet	extended	indet	no	sides
15182	b							25	poor	indet	indet	indet	no	indet
15190	a							25	poor	indet	extended	indet	no	sides
15190	b							25	poor	indet	extended	indet	no	
15193	a							50	fair	indet	extended	hexagonal	no	indet
15193	b							50	fair	indet	extended	indet	no	indet
15196	a						photo	50	fair	indet	extended	hexagonal	no	pelvis
15201	a							50	poor	indet	extended	unk	no	
15201b	b							50	fair	160.00	extended	unk	yes	
15214	a							25	poor	indet	extended	indet	no	sides
15214	b							50	fair	173.76	extended	indet	no	pelvis
15216	c							25	poor	indet	indet	indet	no	indet
15219	a					osteoporosis		75	fair	177.29	extended	indet	no	pelvis
15219	b						photo	75	good	175.17	extended	indet	yes	abdomen
15221	a							75	fair	166.13	extended	indet	no	chest
15221	b					DISH endocranial	photo	75+	good	173.044	extended	indet	no	pelvis
15229	c							25	poor	indet	indet	indet	no	indet
15231	a							75+	poor	178.558	extended	indet	no	abdomen
15231	b						photo	75	good	indet	extended	indet	no	sides
15238	a							25	poor	indet	indet	indet	no	indet

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
15239	a	20	20	male	gunshot victim trauma	yes	yes	yes	caries		periodontal disease										
15241	b	4.5	4.5	indet		yes		yes									enamel hypoplasia				
15259	a	51	50	female	Ida Mancini died 1931 TB Hospital	yes	yes	yes												TB by historic records	
15261	a	59	54	male	Harry Herman died 1930 County Hospital	yes	yes														
15261	c	adult	adult	male	Charles Noddin died 1931 County Hospital	yes	yes	yes					mandible and maxilla edentulous	alveolar resorption							
15262	a	60	45+	male	Henry Schmidt died 1911 Hoboken	yes	yes	yes	caries						cusps worn to dentine			lesion- endocranial on frontal bone			
15262	b	31	39	male	Peter Peterson died 1911 Hoboken	yes		yes				calculus			cusps worn to dentine						
15265	a	35	30-34	male	Unknown Man died 1911 Jersey City	yes		yes	caries												
15265	b	50	39	male	Unknown Man died 1911 Jersey City	yes	yes	yes									enamel hypoplasia, bone infection	endocranial lesions along menengeal artery- chronic ear infection			
15270	a	40	50+	male	Gotthud Munz died 1910 Jersey City	yes		yes							cusps worn to dentine						
15270	b	55	adult	male	James Daly died 1910 Jersey City	yes	yes											endocranial lesions at site of cranial wound			
15280	a	21	20	female	Adela Vontuseska died 1912 Hoboken,	yes		yes								black teeth					
15280	b	35	25-35	male	F. Springer died 1912 Hoboken, Carabelli's cusp	yes		yes								black teeth	Carabelli's cusp				
15290	a	40	50	male	William Reynolds died 1911 Jersey City																
15290	b	40	20	male	Gustaav Poulsen died 1911 Jersey City																
15291	a	50	50	male																	
15292	a	45	35	male	Unknown Man died 1910 Jersey City	yes		yes							cusps worn to dentine						
15292	b	26	24	male	Emil Ozrzey died 1910 Hoboken																
15294	a	adult	adult	male		yes	yes	yes	caries										cribra orbitalia		
15294	b	39	39	male		yes	yes	yes	caries										spina bifida minor		
15304	a	35	21-25	male	Unknown man died 1911 Jersey City	yes		yes							cusps worn flat						
15304	b	50	35-42	male	Unknown Man died 1911 Jersey City	yes		yes							cusps worn to dentine						
15340	a	unk in records	adult	female	Ellen Brennan died 1922 Asylum	yes	yes											lesion, endocranial nodular hyperostosis, Gummatous condition			
15340	b	38+	38+	male	Charles Martin died 1922 Asylum	yes	yes											lesion, button osteoma cancer parietal		cancer, osteoma	
15412	a	2	2.5	female	Alice Sachs died 1920 Contagious Disease Hospital																
15465	a	8mos	subadult	indet	Francis Brennan Died 1920 Almshouse																
15472	c	1 mos	1	male	John Cortese Died 1922 Kearny																
15484	a	2 months	.2	indet	Fultever Florence Died 1919 Almshouse																
15485	a	2 hours	subadult	female	Baby Kassy died 1919 TB hospital															Mother was probably inTB hospital by records	

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
15239	a			compression fracture on frontal bone			photo	50	poor	indet	extended	indet	no	abdomen
15241	b							25	poor	indet	indet	indet	no	indet
15259	a							25	fair	indet	disarticulated	indet	no	indet
15261	a		osteoarthritis					25	poor	indet	disarticulated	indet	no	indet
15261	c			fracture, humerus			photo	25	fair	indet	disarticulated	indet	no	indet
15262	a		osteoarthritis		fusion			50	poor	indet	extended	indet	no	abdomen
15262	b							50	poor	166.13	extended	indet	no	abdomen
15265	a							25	fair	174.7	extended	rectangular	no	sides
15265	b			puncture wound in humerus			photo	25	fair	171.78	extended	rectangular	no	abdomen
15270	a							50	fair	167.08	extended	hexagonal	no	sides
15270	b			depression fracture on parietal			photo	75	poor	indet	extended	hexagonal	no	pelvis
15280	a							25	poor	indet	extended	indet	no	pelvis
15280	b							25	poor	indet	extended	indet	no	indet
15290	a							25	poor	indet	extended	indet	no	sides
15290	b							25	poor	170.65	extended	indet	no	abdomen
15291	a							50	poor	indet	extended	hexagonal	no	indet
15292	a							50	poor	174.46	extended	indet	no	pelvis
15292	b							75	fair	156.35	extended	indet	no	pelvis
15294	a						photo	50	poor	indet	extended	indet	no	sides
15294	b							75+	poor	indet	extended	indet	no	pelvis
15304	a							75	poor	163.75	extended	rectangular	no	sides
15304	b							50	poor	167.79	extended	rectangular	yes	indet
15340	a						photo	25	poor	indet	extended	indet	no	pelvis
15340	b							25	fair	indet	extended	indet	no	sides
15412	a							25	poor	indet	extended	indet	no	indet
15465	a							25	poor	indet	extended	indet	no	indet
15472	c							75	fair	176.84	extended	rectangular	no	indet
15484	a							25	poor	indet	extended	indet	no	indet
15485	a							25	poor	indet	extended	tapered	no	indet

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
15488	d	5	5	indet																	
15501	a	37	25-35	male	Samuel Hickson died 1918 Jersey City																
15501	b	77	60+	male	Oswald Vetterberg died 1918 Alms House	yes	yes	yes							cusps worn to dentine						
15505	b	19	19-20	male	Leg Brace, Zak Kennedy died 1917 Jersey City																
15531	a	55	59+	male	Samuuel Hill died 1917 Tuberculosis Hospital	yes	yes	yes	caries						cusps worn flat					TB by Historic Records	
15531	b	65	59+	male	unknown man died 1917 Jersey City	yes		yes		abscess	periodontal disease				cusps worn to dentine						
15537	a	55	35<	male	Patrick Jordan died 1917 Jersey City																
15537	b	37	30+	male	Thomas Rafferty died 1917 Jersey City	yes	yes											osteophytic growth above acetabulum due to trauma			
15539	b	45	33-42	male	face down in Metal lined coffin; unknown man died 1917 Jersey City	yes		yes	caries			calculus									
15541	a	38	35	male	Francisco Belbra Atica died 1917 Hoboken																
15541	b	65	50+	male	unknown man died 1917 Jersey City	yes	yes	yes	caries		periodontal disease							lesion			
15549	a	35	35	male	Phillip Feraro died 1917 Tuberculosis Hospital	yes	yes	yes							cusps worn and polished					TB by historic records	
15549	b	44	44	female	Lizia Murakowska died 1917 Jersey City	yes		yes					mandible edentulous	alveolar resorption							
15560	a	25	25	male																	
15560	b	33	33	male		yes		yes	caries								gold teeth, gold bridge				
15571	a	45	50+	male	Gustave Miller died 1927 Jersey City	yes	yes	yes							cusps worn flat						
15571	b	82	adult	female	Anna Josephson died 1917 Alms House	yes	yes	yes									enamel hypoplasia	cribra orbitalia	porotic hyperostosis		
15572	a	52	35-45	male	Franze Pfetzner died 1917 Alms House	yes	yes	yes							cusps worn flat						
15572	b	51	51	male	Unknown Man (Probably Frederick Roch) died 1917 Jersey City	yes		yes							cusps worn to dentine						
15581	a	49	30	male	William Scherthof died 1917 TB Hospital	yes	yes											endocranial lesions on frontal bone		TB confirmed by Historic Records	
15581	b	33	25-30	female	Jamie Shaif died 1917 Jersey City																
15582	a	50	50	male		yes		yes	caries						cusps worn to dentine						
15582	b	33	33	male		yes		yes	caries						cusps worn to dentine						
15583	a	25	25-30	male	Joseph White died 1917 Jersey City	yes	yes	yes	caries												
15583	b	50	adult	male	John DeCoursney died 1917 Jersey City	yes		yes	caries												
15588	a	50	42	male	James Pendergast died 1917 Jersey City	yes		yes				calculus			cusps worn to dentine						
15588	b	52	35-45	male	Patrick Searson died 1917 Tuberculosis Hospital	yes	yes													TB by Historic Records	
15589	a	38	42	male	Stephen Hammell died 1918 Jersey City	yes	yes	yes	caries								enamel hypoplasia	cribra orbitalia, endocranial lesion on frontal aka lobular glummatomus osteoma			
15589	b	40	50	male	Tony Maggito died 1918 Jersey City	yes		yes									enamel hypoplasia				
15590	a	45	35-45	male	John Schneider died 1917 Jersey City	yes		yes							cusps worn to dentine		enamel hypoplasia				

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
15488	d							25	poor	indet	indet	indet	no	indet
15501	a							50	poor	184.932	extended	indet	no	pelvis
15501	b					osteoporosis		75	fair	indet	extended	indet	no	chest
15505	b							75	poor	172.79	extended	indet	no	chest
15531	a							75	fair	indet	extended	indet	no	pelvis
15531	b			fracture, ulna				75	good	164.22	extended	indet	no	sides
15537	a							50	poor	indet	extended	indet	no	sides
15537	b			trauma				25	poor	indet	extended	indet	no	sides
15539	b							75+	good	180.564	extended	tapered	no	pelvis
15541	a							50	fair	indet	extended	indet	no	sides
15541	b							50	fair	indet	extended	indet	no	sides
15549	a							50	fair	indet	extended	indet	no	pelvis
15549	b							75	poor	indet	extended	indet	no	pelvis
15560	a							75	poor	indet	extended	indet	no	abdomen
15560	b							75	poor	160.98	extended	indet	no	abdomen
15571	a					osteoporosis		50	fair	indet	extended	indet	no	indet
15571	b						photo	25	poor	indet	extended	indet	no	indet
15572	a		osteoarthritis on talus (eburnation)					25	poor	indet	extended	indet	no	sides
15572	b							75	fair	173.27	extended	indet	no	sides
15581	a							25	poor	169.01	extended	indet	no	pelvis
15581	b							50	fair	indet	extended	indet	no	abdomen
15582	a							50	fair	indet	extended	indet	no	sides
15582	b							50	poor				no	sides
15583	a			fracture femur				50	fair	indet	extended	indet	no	indet
15583	b							75	fair	indet	extended	indet	no	sides
15588	a							75	fair	170.89	extended	indet	no	abdomen
15588	b							50	fair	indet	extended	indet	no	pelvis
15589	a							50	fair	indet	extended	indet	no	indet
15589	b							50	fair	indet	extended	indet	no	pelvis
15590	a							75	poor	160.65	extended	indet	no	sides

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
15590	b	26	25-30	male	Angelo Orbacchio died 1917 Tuberculosis Hospital	yes	yes	yes	caries						cusps worn to dentine					TB by Historic Records	
15604	a	60	45	male	Joseph Halron died 1917 Jersey City	yes		yes													
15604	b	65	42+	male	John Campbell died 1917 Jersey City																
15612	a	38<	38<	male																	
15621	a	26-35	26-35	male																	
15623	a	40	40	male		yes		yes				calculus				black teeth					
15623	b	adult	adult	male																	
15634	a	adult	adult	indet		yes		yes				calculus			cusps worn flat						
15644	a	50+	50+	indet																	
15649	a	50	50<	male	William Nolan died 1910 Jersey City																
15649	b	40	45+	male	Unknown Man died 1910 Jersey City	yes		yes							cusps worn to dentine						
15650	a	35	25-35	male	Human bones died 1911 Jersey City	yes	yes														
15651	a	45	35-45	male	William Brooks died 1911 Jersey City	yes		yes							cusps worn to dentine						
15651	b	65	55+	male	William Lavignan died 1911 Jersey City	yes	yes	yes							cusps worn to dentine						
15662	a	50	51	male	Rudolph Eise died 1913 Hoboken																
15662	b	75	59	female	Elizabeth Sullivan died 1913 Alms House																
15664	b	39	35-50	male	Thomas Thompson died 1923 Jersey City																
15670	a	40	35-45	male	Unknown Man died 1911 Jersey City																
15670	b	60	adult	male	Unknown Man died 1911 Jersey City																
15671	a	29	29-35	male	Max Walluf died 1912 Jersey City	yes		yes	caries								notched incisor				
15671	b	45	48	male	Chrisitan Kelsen died 1912 Alms House	yes	yes											lesion			
15672	a	35	50<	male	Charles Banfield died 1913 TB Hospital	yes	yes													TB by records	
15674	a	71	adult	male	Henry Burger or Burket died 1913 Alms House																
15677	a	48	adult	male	James Moore died 1912 TB Hospital	yes	yes													TB records	
15677	b	45	50<	male	Louis Larson Bie died 1912 Jersey City																
15695	a	adult	adult	male																	
15695	b	35+	35+	male		yes	yes														autopsy cranial
15695	c	35	35	male		yes	yes														autopsy cranial
15695	d	45-55	45-55	male		yes	yes	yes							cusps worn flat						autopsy cranial
15709	a	45	36-50	male	Unknown Man died 1911 Jersey City																
15709	b	38	36-50	male	John Brown died 1911 Jersey City	yes		yes									gold crown				autopsy cranial
15709	c	45	45	male	Unknown Man died 1911 Bayonne	yes		yes							cusps worn to dentine						
15713	a	50	50	male		yes	yes														
15713	b	45	45	male		yes		yes					maxilla edentulous	alveolar resorption			impacted canine				

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
15590	b							50	poor	indet	extended	indet	no	abdomen
15604	a							25	poor	indet	extended	indet	no	indet
15604	b							25	poor	indet	extended	indet	no	indet
15612	a							25	poor	indet	extended	indet	no	indet
15621	a							75	fair	indet	extended	tapered	no	indet
15623	a							50	good	178.03	extended	rectangular	no	sides
15623	b							50	fair	indet	extended	hexagonal	no	indet
15634	a							25	poor	indet	extended	rectangular	no	indet
15644	a							25	poor	indet	extended	tapered	no	indet
15649	a							50	fair	indet	extended	indet	no	abdomen
15649	b							25	fair	indet	extended	indet	no	indet
15650	a					unusually thick cranium		75	fair	indet	extended	indet	no	indet
15651	a							50	fair	indet	extended	indet	no	sides
15651	b					Osteoporosis		25	fair	indet	extended	indet	no	abdomen
15662	a							50	poor	180.41	extended	indet	no	abdomen
15662	b							25	poor	indet	extended	indet	no	indet
15664	b							25	poor	indet	extended	indet	no	indet
15670	a							50	poor	indet	extended	rectangular	no	indet
15670	b							50	poor	indet	extended	rectangular	no	indet
15671	a							50	poor	indet	extended	tapered	no	abdomen
15671	b							50	poor	indet	extended	tapered	no	abdomen
15672	a							50	poor	indet	extended	indet	no	indet
15674	a							50	poor	indet	extended	indet	no	indet
15677	a							50	poor	indet	extended	indet	no	indet
15677	b							25	poor	indet	extended	indet	no	indet
15695	a							25	poor	indet	disarticulated	indet	no	indet
15695	b						photo	25	fair	indet	disarticulated	indet	no	indet
15695	c							25	fair	indet	disarticulated	indet	no	indet
15695	d							25	good	indet	disarticulated	indet	no	indet
15709	a							25	poor	indet	disarticulated	indet	no	indet
15709	b						photo	75	poor	indet	extended	indet	no	sides
15709	c							75	fair	indet	extended	indet	no	chest
15713	a					osteoporosis		75	poor	indet	extended	indet	no	pelvis
15713	b							75	good	indet	extended	indet	no	indet

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
15714	a	32	35-45	male	John Student died 1908 Jersey City	yes		yes							cusps worn to dentine						
15714	b	39	25-35	male	Andreas Loeb died 1908 Hoboken																
15717	a	45	45	male																	
15717	b	45	45	male		yes		yes							cusps worn to dentine						
15719	a	48.5+- 10.5	48.5+- 10.5	male	possible Afro-American	yes	yes												occipital deformation		
15719	b	35-45	35-45	male		yes	yes	yes							cusps worn flat			cribra orbitalia and lesions in orbits			
15727	a	45	60+	male	Unknown Man died 1913 Jersey City	yes	yes	yes					mandible and maxilla edentulous	alveolar resorption							
15727	b	50	adult	male	Unknown Man died 1913 Hoboken	yes	yes														autopsy
15729	a	40	35-45	male	Jacob Noss died 1911 Jersey City	yes		yes							cusps worn flat						
15729	b	35	30	male	Unknown Man died 1911 Jersey City	yes		yes	caries								gold crown, gold bridge				
15736	a	32	25-35	male	Haywood Oakley died 1910 Tuberculosis Hospital, bullet in grave	yes	yes	yes	caries							black teeth				TB by Historic Records	
15736	b	49	44	male	Otto Quindt died 1910 Jersey City																
15759	b	50	50	male																	
15761	b	45	50<	male	William Bridges died 1910 Jersey City																
15762	a	35	35	indet		yes		yes	caries												
15766	a	20	20	male	John Guale died 1908 Jersey City	yes		yes									supernumerary tooth				
15778	a	50+	50+	male		yes	yes														
15780	a	50	50	male																	
15780	b	42+	42+	male																	
15785	a	40	adult	female	Unknown woman died 1909 Jersey City																
15785	b	35	35	male	Anthony Napuski died 1909 Jersey City	yes		yes							cusps worn to dentine						
15802	a	40	40	male	Stephen Doyel died 1910 Jersey City	yes		yes			periodontal disease										
15802	b	37	35-40	male	Richard J. Lisboa died 1910 Jersey City	yes		yes					mandible and maxilla edentulous	alveolar resorption							
15806	a	35+	35+	male		yes		yes				calculus			cusps worn to dentine		impacted tooth				
15808	a	71	45.2+- 12.6	male	Henry Penssa died 1910 Alms House	yes	yes														
15808	b	50	35	male	Unknown Man, AJ Volk died 1910 Hoboken																
15809	b	24	35<	male	Antonio Tobiso died 1909 Jersey City	yes		yes								black teeth					
15812	a	38	48.8+- 10.5	female	Mary Bromock died 1910 Hoboken																
15812	b	69	48.8+- 10.5	male	Henry Witte died 1910 Hoboken																
15828	b	40	40	male		yes	yes	yes	caries												autopsy cranial

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
15714	a							25	fair	indet	extended	indet	no	abdomen
15714	b							50	fair	indet	extended	indet	no	indet
15717	a							75	poor	indet	extended	indet	no	chest
15717	b							75	fair	indet	extended	indet	no	abdomen
15719	a							50	poor	indet	extended	indet	no	sides
15719	b							75	fair	indet	extended	indet	no	indet
15727	a					Osteoporosis		50	poor	167.32	extended	indet	no	pelvis
15727	b							25	poor	indet	extended	indet	no	indet
15729	a							25	poor	indet	extended	rectangular	no	indet
15729	b							25	poor	indet	extended	rectangular	no	indet
15736	a							50	fair	indet	extended	rectangular	no	abdomen
15736	b							25	poor	indet	extended	indet	no	abdomen
15759	b							50	fair	168.77	extended	none	no	sides
15761	b							50	fair	indet	extended	tapered	yes	pelvis
15762	a							25	poor	indet	extended	rectangular	no	indet
15766	a						photo	25	poor	indet	extended	indet	no	indet
15778	a					Osteoporosis		25	poor	indet	extended	indet	no	indet
15780	a							25	fair	indet	disarticulated	indet	no	indet
15780	b							25	poor	indet	extended	indet	no	indet
15785	a							25	poor	indet	indet	indet	no	indet
15785	b							25	poor	indet	indet	none	no	indet
15802	a							75	good	indet	extended	indet	no	sides
15802	b							25	fair	indet	extended	indet	no	indet
15806	a							50	fair	indet	extended	indet	no	pelvis
15808	a					Osteoporosis		50	fair	indet	extended	indet	no	pelvis
15808	b							75+	poor	indet	extended	indet	no	sides
15809	b							25	poor	indet	extended	indet	no	indet
15812	a							25	poor	indet	extended	indet	no	indet
15812	b							25	poor	indet	extended	indet	no	indet
15828	b		osteoarthritis, first metacarpal	tarsal phalange has hole (nail) through bone				75	good	179.22	extended	indet	no	abdomen

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	age	osteo age	gender	comment	pathology	osteo path	dental path	caries	abscess	periodontal disease	calculus	edentulous	alveolar resorption	severe tooth wear	discoloration	misc	lesion	developmental	infectious disease	autopsy
15829	a	32	35	male	Michael Moore died 1910 Bayonne																
15829	b	38	31-35	male	Unknown man died 1910 Jersey City	yes		yes	caries												
15834	a	adult	adult	indet																	
15834	b	adult	adult	indet																	
15835	a	22	29<	male	John Ward died 1916 Jersey City	yes		yes									crenulation on occlusal surface of second molar				
15835	b	45	45+	male	Albert Williams died 1916 Tuberculosis Hospital	yes	yes	yes	caries		periodontal disease				cusps worn flat					TB by Historic Records	
15844	a	68	50+	male	Michael Strouss died 1902 Jersey City	yes		yes			periodontal disease				cusps worn flat						
15844	b	21	20-25	male	Olaf Tommiason died 1902 Jersey City																
15859	a	35	30	male	James McCreary died 1916 Jersey City																
15859	b	50	42-50	male	Patrick Madady died 1916 Alms House	yes		yes							cusps worn flat						
15861	a	38	21-35	male	Earle Hudson died 1916 Jersey City	yes		yes	caries	abscess					cusps worn to dentine						
15861	b	60	adult	male	Unknown Man died 1916 Jersey City																
15865	a	38+	38+	male																	
15868	a	40	39	male	Unknown man died 1918 Jersey City	yes		yes							cusps worn flat	black teeth					
15887	b	35-40	35-40	female		yes		yes		abscess		calculus			cusps worn to dentine			infection, cloaca-osteomyelitis on femur			
15899	a	indet	indet	indet		yes		yes									impacted tooth				
20000	bm	2-4	2-4	indet													cribra orbitalia				

TABLE 9-3
Potter's Field
Osteological Sample Population Data

burial#	shaft pos	amputation	osteoarthritis	trauma	fusion	misc	photo	% complete	pres	stature	body position	coffin	tissue	arm position
15829	a							25	poor	indet	extended	indet	no	pelvis
15829	b							75	poor	157.8	extended	indet	no	abdomen
15834	a							50	fair	indet	extended	indet	no	abdomen
15834	b							50	poor	indet	extended	indet	no	indet
15835	a							50	fair	indet	extended	indet	no	sides
15835	b							50	poor	indet	extended	indet	no	pelvis
15844	a							25	poor	indet	extended	rectangular	no	indet
15844	b							50	fair	indet	extended	rectangular	no	pelvis
15859	a							25	poor	indet	extended	rectangular	no	indet
15859	b							50	fair	indet	extended	rectangular	no	abdomen
15861	a							25	poor	indet	extended	rectangular	no	sides
15861	b							25	poor	indet	extended	rectangular	no	indet
15865	a							50	poor	indet	extended	hexagonal	no	
15868	a							75+	good	indet	extended	rectangular	no	abdomen
15887	b			fracture femur				25	poor	181.058	extended	rectangular	no	sides
15899	a						photo	50	fair	indet	extended	indet	no	sides
20000	bm							25	poor					

O. SUMMARY DISCUSSION

A total of 4,571 burials were disinterred from Potter's Field. This burial population included numerous primary inhumations, several secondary inhumations (Turnpike's reinterment of 43 individuals), one cremation, one mass burial (N=65 individuals), and a set of fetal remains placed within a jar of formaldehyde.

1. Data Collected

For all 4,571 burials exhumed from Potter's Field, base-line data regarding gender, age, and stature were recorded. From this total burial population, a subset or subpopulation was created and designated the osteological analysis sample population. The osteological sample population consisted of 409 burials (8.9 percent of the total burial population). This sample population was created so that additional, more extensive osteological and forensic analyses could be conducted.

The burial excavations resulted in the recovery of 1,844 males (40 percent of the recovered burial population), 671 females (15 percent of the total population), and 2,056 individuals in which gender was indeterminate (45 percent). The sample population selected for additional, more extensive osteological analysis, contained 272 males (67 percent of the sample population), 48 females (11 percent) and 89 individuals in which the gender was indeterminate (22 percent). Of the 89 individuals in the sample population where gender could not be determined, 67 (75 percent of the indeterminate group) were children. Sexually diamorphic traits are not fully developed in children making a determination of sex in children highly problematic. However, overall when the historic records of males and females interred within Potter's Field is compared to the ratios and percentages reflected in both levels of osteological analysis, there is not significant differences between these two sources of data. Further, it is interesting to note – and not unexpected given the socio-economic status and points of origin of the deceased – that males dominate the burial population at Potter's Field.

The age at death determined for the total burial population indicates that there were 18 fetal remains, 33 individuals were less than three years of age, 23 individuals were less than 12 years of age, 103 of the burials were less than 20 years old, 679 of the burials were less than 35 years old, 928 of the individuals were less than 50 years old, and 438 of the individuals were greater than 50 years old. There were 1,466 burials that were so deteriorated than the age at death could not be determined. Further, the preservation of some of the burials prohibited a specific age determination and could only be identified as sub-adult versus adult. There were 26 sub-adult individuals and 857 adult individuals in this final age group.

The osteological sample also was assessed for age and there were 19 fetus, 22 individuals less than three years old, 19 burials less than 12 years old, 10 were less than 20 years old, 61 individuals were less than 35 years old, 115 of the remains were less than 50 years old, and 127 individuals were greater than 50 years old. The remaining individuals were in such poor condition that only the broad categories of sub-adult, adult, and indeterminate could be determined. Eleven of these individuals were assigned to the sub-adult category, while 18 burials were placed in the adult category. The remaining seven individuals were indeterminate as to age.

When compared to historic death rates, it was observed that there were a proportionately low number of children in this burial population for the historic time period at Potter's Field (circa 1895-1962). This is not surprising when one considers the source of this burial population. Intuitively, during the time frame for the Hudson County Burial Grounds, the County penitentiary, and jails would be devoid of children, the contagious disease hospital would have a small number of children, and the mental health hospital may also have a small number of children. The almshouse would be the logical source for the majority of children recovered in this burial population. In fact, historic records indicate that 63 percent of the infant burials at Potter's Field originated in the almshouse.

The average height in the Potter's Field burial population was calculated and males displayed an average height of 168.69 centimeters (5'5") while females averaged 162.30 centimeters (5'3"). Those individuals of indeterminate gender averaged 166.85 centimeters (5'5"). Males in the total burial population averaged two inches taller than females. Males in the Potter's Field population averaged two to three inches shorter than modern males of today. Females from Potter's Field are similar to today's female average. The discrepancy in heights may be due to malnutrition and disease or possibly due to the early immigrant status of this initial burial population that comprised a large portion of the interred. As discussed in this chapter, previous studies demonstrate a direct correlation between socio-economic status and an individual's height – indicating that the higher a person's socio-economic status, the greater their height.

The skeletal material in the Potter's Field burial population only had four individuals who were positively identified as African–American or Black. None of the skeletal population could be positively identified as Mongoloid, although there were three individuals who displayed shoveling of the incisors which is a diagnostic trait of Mongoloid populations. However, such a trait on its own is insufficient to classify the skeletal remains as being Mongoloid, and thus additional traits must be sought for such a racial determination. In all three cases preservation was extremely poor and thus, no other Mongoloid traits could be observed. None of these individuals can be positively classified as Mongoloid. The vast majority of the Potter's Field burial population had morphological traits characteristic of Caucasoids.

2. Health, Pathologies, and Congenital Anomalies of the Population

Generally, the Potter's Field burial population appears unhealthy compared to most population groups of corresponding time periods and places of origin. Of the 1,965 skeletons which were both complete enough and preserved well enough to undertake any form of osteological analysis, 653 displayed clear evidence of skeletal pathologies. Within the 409 individuals contained within the sample population that underwent detailed osteological and forensic analyses, 245 skeletons contained observable pathologies.

Less than one percent (N=24) of the total burial population exhibited evidence of amputations. A total of 95 autopsies were recorded within the total burial population of Potter's Field. A total of 250 individuals were observed to have some type of dental pathology. Evidence of trauma was also found on the skeletal remains recovered from Potter' Field. There were 133 individuals from the total burial population that exhibited osteological evidence of fractures. Besides fractures, other evidence of trauma was also discovered on the skeletal remains recovered from Potter's Field. Two cracked skulls were observed at Potter's Field for which the instrument that delivered the blow remains unknown. Only one individual recovered from the Potter's Field displayed clear evidence of gunshot wounds. One example of blunt force trauma most likely caused by a hammer blow also was discovered while another individual displayed evidence of bladed (knife) fracture wounds. In addition to fractures and trauma wounds, there were numerous cases were the bones had become fused to one another during the recovery process while healing from a severe trauma or infection. Other pathologies included DISH, vertical disk hernia, tuberculosis, cerebral palsy, and congenital anomalies such as spina bifida, cleft palate, microcephaly, and Proximal Femoral Focal Deficiency.

3. Origins of the Burial Population

Historic records, along with corresponding and supporting osteological analysis, indicate that this burial population was derived from the less-fortunate members of Hudson County, New Jersey society – dating from the late 1880's until 1962. The deceased came from the local almshouse, the mental hospital, local morticians, the contagious disease hospital, local general hospitals, county jail, as well as various cities and urban centers within Hudson County. Some of the associated historic records also indicate that a vast majority of these individuals were immigrants newly arrived from western European counties like Italy, Greece, Germany, and so forth.

The osteological and forensic analyses conducted on these remains generally reflect this populations disadvantaged socio-economic status. Osteological observations revealed substantial indications of dietary stress characteristic of being poor, hungry, and often unable to get regular meals or consume healthy food. Numerous cases of severe stress or joint/muscle use, evidence of long-term, strenuous manual labor which is often argued to reflect menial jobs typical of lower socio-economic positions, also were evident within the Potter's Field burial population. Autopsy patterns reflect several cranial autopsies being performed on the deceased mental hospital patients and evidence of severe physical trauma and gunshot wounds were also noted.

Thus, the osteological data appears to closely reflect what the historic record has documented for the individuals buried within one of Hudson County's Burial Grounds – that these individuals derived primarily from the poor and disadvantaged members of late nineteenth and early twentieth century New Jersey. That life was hard and those hardships are often reflected in the mortal remains left behind after death. However, as other chapters within this report demonstrate, in many cases – no matter how disadvantaged or sick an individual might have been – there is compelling evidence of other human beings caring for these less fortunate and unhealthy members of society with dignity and respect.

CHAPTER 10. REINTERMENT

A. MASS REBURIAL

The reinterment program consisted of several tasks: selection of a reinterment cemetery; preparation of the reinterment parcel, including installation of burial vaults; documenting the transfer of remains from Potter's Field to the new cemetery; and design and installation of monuments memorializing the Potter's Field disinterment and reinterment program.

Prior to the issuance of the Final Order and Judgment from the Court, a reinterment cemetery with sufficient contiguous space to accept the estimated 3,500 burials recovered from Potter's Field had to be selected. Moreover, in keeping with the Court's assertion that the deceased at Potter's Field were all former residents of Hudson County, a diligent search was initiated to locate a cemetery within Hudson County. An additional consideration in the selection process was that, if possible, the reinterment cemetery be nondenominational since Potter's Field likely accepted persons of various faiths.

For purposes of estimating the total area that might be needed for reburial, it was presumed that the majority of exhumed remains would be placed in new containers and that standard triple-depth pre-cast concrete burial vaults, each measuring 7.7 feet long by 3.0 feet wide by 9.0 feet deep (each burial vault is sized to fit in a standard grave plot of 3.0x8.0 feet), would each hold approximately 50 new containers. It was therefore estimated that approximately 100 grave plots (approximately 2,400 square feet of ground surface) would be required for the reburial of remains from Potter's Field. Furthermore, the purchase of more than 17 graves in a single transaction would be considered a "bulk sale" pursuant to the New Jersey Administrative Code (N.J.A.C.) 13:44J2-1 (definitions) and therefore subject to approval by the New Jersey Cemetery Board.

As a result of the search for a reinterment cemetery within Hudson County, only one of about 11 cemeteries in the County met the project's requirements and considerations. The Turnpike Authority therefore selected and executed an agreement with the Hoboken Cemetery on Tonnelle Avenue in North Bergen Township, Hudson County, located approximately 5 miles from Potter's Field. Ultimately, the Cemetery Board approved the bulk sale of graves and the Judge overseeing the Turnpike Authority's case readily approved the selected cemetery.

In September 2003 an unforeseen situation occurred at the Hoboken Cemetery as Berger's archaeological team was initiating logistical tasks for the reinterment of remains from Potter's Field. Given the seriousness of the situation, the Turnpike Authority decided to cancel their agreement with Hoboken Cemetery and initiate a new search for a reinterment cemetery.

After conducting a second diligent search to identify cemeteries with sufficient space to reinter the remains from Potter's Field, none could be located within Hudson County. Therefore, the Turnpike Authority explored the possibility that a cemetery in an adjoining county may have available space. Unexpectedly, the representative for the Maple Grove Park Cemetery in the Town of Hackensack, Bergen County, notified the Turnpike Authority that they had available space and would be willing to accept the remains from Potter's Field into their cemetery. To ensure that the available space was free from prior burials, the Turnpike Authority requested Berger's archaeological team to inspect the area with several deep trenches to assess the stratigraphic profile and examine the soil matrix. The deep trenching and inspection demonstrated that the available property was free of prior interments and suitable for use by the Turnpike Authority. After personally visiting the cemetery and hearing testimony confirming the inability to locate a suitable cemetery within Hudson County, the Court approved the 50x62-foot portion of Section K at Maple Grove Park Cemetery as the designated reinterment cemetery for the Potter's Field remains (Plates 10-1 and 10-2).

PLATE 10-1: Maple Grove Park Cemetery Office

LATE 10-2: Reinterment Parcel for Potter's Field

In October 2003 Berger initiated the reinterment program for the 4,569 unclaimed individuals recovered from Potter's Field in accordance with the Detailed Reinterment Plan approved by the Chancery Division `of the Superior Court of New Jersey.

The first task was the installation of 100 standard triple-depth pre-cast concrete burial vaults (Plate 10-3) into the 50x62-foot portion of Section K at Maple Grove Park Cemetery. Site excavations and vault installations were conducted by a privately owned vault company and supervised by the Turnpike Authority, Berger, and the President of the Maple Grove Park Cemetery. Prior to installation Berger in consultation with the Turnpike Authority prepared a sketch plan for the arrangement of vaults, reserving sufficient area for the installation of the memorial monument and avoiding the root systems of existing large trees. The burial vaults were then arranged in numerical order starting with burial vault 1 in the northeast corner of the reinterment parcel and continuing along a north-south orientation and numerical arrangement extending across 19 rows (Plate 10-4 and Figure 10-1).

PLATE 10-3: Triple-Depth Pre-Cast Concrete Vaults

PLATE 10-4: Installation of Burial Vaults

As excavation and installation were being performed, Berger's team was preparing for the documented transfer of remains from Potter's Field to the reinterment cemetery. Pursuant to the Final Court Order, Berger was responsible for transporting, loading, and documenting the reburial of remains. During the exhumation process disinterred remains were placed in three different sizes of containers depending on the type of remains: brown containers measuring 16.5x14x11 inches, or one of two different white containers measuring 26x14x10.5 inches and 26.5x16x10.5 inches. Each container of human remains and/or personal effects was clearly labeled on the outside with Berger's burial shaft number (Shaft Number). Prior to the reinterment process, it was determined that a maximum of 70 brown containers or

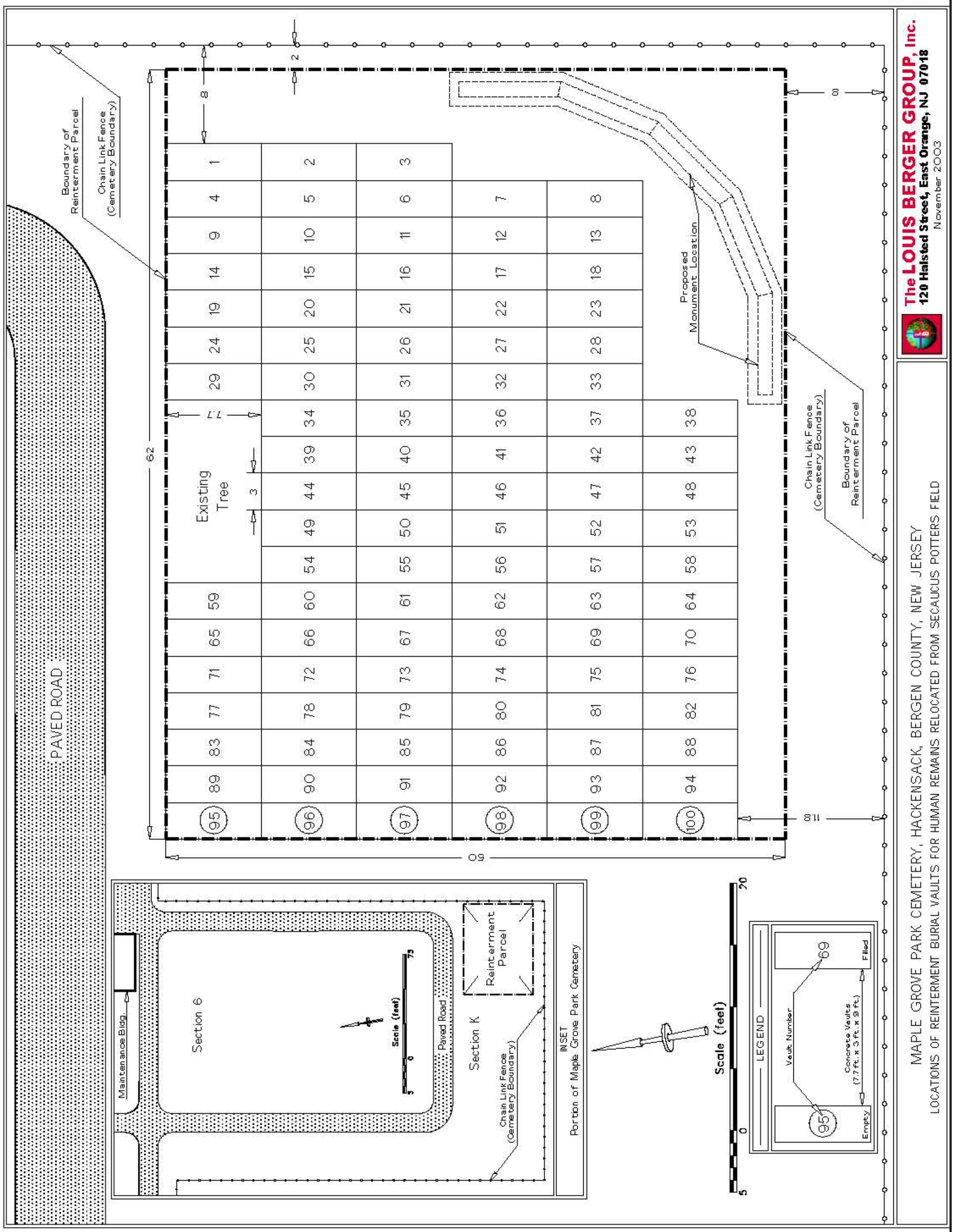


FIGURE 10-1: Location and Arrangement of Reinterment Burial Vaults, Maple Grove Park Cemetery

42 white containers could be placed within each pre-cast burial vault. As such, a presorting of containers was conducted at the Potter's Field temporary on-site storage facility so that the appropriate number of the different sized containers would arrive daily at Maple Grove Park Cemetery for reburial.

Berger's procedures for transporting and loading each burial vault consisted of a series of computerized checklists and manual sorting procedures. The computerized checklist was the foundation of the reinterment inventory database that is a key administrative document for both the Maple Grove Park Cemetery as perpetual overseer of the remains and for any potential future inquiries concerning deceased relatives once laid to rest at Potter's Field. Therefore, meticulous record keeping continued to be an essential task of Berger's work throughout the reinterment program. In addition, one of Berger's elective tasks during this phase of the project was to ensure that all containers from a particular burial shaft at Potter's Field were reinterred in the same burial vault at the Maple Grove Park Cemetery. In this regard, all remains and personal effects exhumed together would reside together in perpetuity.

As each container was loaded onto a small panel truck at Potter's Field, it was checked against the master list of disinterred remains to ensure that all containers associated with particular burial shafts were transported in the same load. Upon arrival at the Maple Grove Park Cemetery the containers were manually off-loaded and wrapped in 3-millimeter poly-film to preserve and protect the integrity of the remains, and a second, more durable tag was then placed on the outside of each wrapped container (Plate 10-5). Each labeled container was then checked off as it was placed into the designated (e.g., numbered) burial vault, and the burial vault number was recorded into the reinterment inventory. In several instances loose coffin wood was also placed within a burial vault and designated on the checklist. The Ziegler box and tin lined coffin were placed in new simple wooden coffins and reburied in Vault 89 (Plate 10-6 and 10-7).

PLATE 10-5: Off-Loading Containers

PLATE 10-6: Off-Loading Coffin with Ziegler Box

PLATE 10-7: Lowering New Coffin into Burial Vault

The entire reburial of remains was completed in 10 days using a dedicated team of six field technicians under the direct supervision of the project's Senior Archaeologist. The reburial proceeded in such a manner that a predetermined number of vaults would be loaded daily and closed (concrete lids placed on the vaults by a boom truck operated by vault company) prior to leaving the cemetery. This procedure was established to ensure the sanctity and protection of the remains. In summary, a total of 94 triple-depth pre-cast concrete vaults were loaded with remains, leaving six empty vaults to constitute the last row in the reinterment parcel for future use, if necessary. A total of 4,816 containers including 279 containers of wood coffin remnants were reburied at the Maple Grove Park Cemetery.

At the conclusion of the reburial process the location of each burial vault was surveyed by Berger's team to assist in any future efforts to relocate and reopen individual burial vaults. The entire reburial parcel was then regraded in preparation for seeding, monument installation, and final landscaping.

In accordance with the Disinterment/Reinterment Plan and subsequent discussions, two memorial monuments were to be designed and installed to commemorate the disinterment and reinterment of remains from Potter's Field. One small granite monument will be erected along the periphery of the newly constructed Secaucus Interchange (once completed in fall 2005) in an effort to memorialize the former site of Potter's Field and inform any future passersby of the location of disinterred remains. The gray granite monument is inscribed with the following passage:

POTTER'S FIELD CEMETERY

This land was originally part of a Hudson County Burial Ground or Potter's Field which from 1880 to 1962 was the final resting place for the county's poor, destitute, and unknown. In 2003 a team of archaeologists working for the New Jersey Turnpike Authority disinterred the remains of 4,571 individuals. The unclaimed remains of 4,569 individuals have been reburied at the Maple Grove Park Cemetery in Hackensack, New Jersey.

A second and larger memorial monument was erected in Section K of the Maple Grove Park Cemetery where the disinterred remains from Potter's Field are reburied. The selection of a corner parcel in Maple Grove Park Cemetery permitted the monument company to design a memorial that was both aesthetically pleasing and an inviting backdrop to the thousands of individuals that had been neglected and forgotten for so many years. As visitors enter this portion of the cemetery, they will undoubtedly take notice of the 7-foot-high granite wall extending approximately 55 feet in length, the largest of all monuments in this portion of the cemetery. In detail, the nearly 30-ton gray granite monument is composed of five large tablets; one center tablet, and four wing tablets carrying 14 large bronze plaques (Plates 10-8 thru 10-10). The center tablet measures 10.5 feet wide by 6.8 feet high, and each of the four wing tablets measure 10.5 feet wide by 5.3 feet height. As a remembrance of the original resting place in Secaucus, a row of red brick salvaged from the former caretaker's cottage at Potter's Field was embedded into the concrete foundation for this massive memorial (Plate 10-11).

PLATE 10-8: Potter's Field Memorial Monument at Maple Grove Park Cemetery

PLATE 10-9: Partial View of Memorial Monument's Center Tablet and Wings

PLATE 10-10: General Setting of Memorial Monument

PLATE 10-11: Red Brick Embedded in Foundation of Memorial Monument

Since only about 825 of the disinterred remains could be matched to entries in the Register of Burials ledgers, it was decided that all names listed in the three-volume set of ledgers would be represented on the monument. As such, 7,767 names arranged in chronological order by month and year of interment at Potter's Field were reproduced on 14 separate 36x48-inch bronze plaques attached to the face of the memorial monument. Finally, to commemorate the lives, sorrows, and reclamation of those buried at the Potter's Field, the following dedication passage has been engraved on the monument:

IN MEMORIUM

This memorial has been erected as a tribute to all those men, women, and children who were laid to rest in the former Hudson County Burial Ground, also known as Snake Hill Cemetery or Potter's Field, in Secaucus, New Jersey. These individuals were buried in the Hudson County Burial Ground because society deemed them poor, medically or mentally unhealthy, criminals, or nameless. This monument stands as a permanent reminder of the 7,767 named individuals and 1,704 unknown souls listed in the burial ledgers from December 1880 to April 1962. We now recognize these people as our mothers and fathers, brothers and sisters, sons and daughters, who were lost but now are found.

In 2003, the remains of 4,569 of these individuals were removed from Potters' Field and brought to this spot to be honored and remembered. May this site serve in perpetuity as their final resting place and sanctuary of peace.

Following installation of the monument, landscape features were added to complete the design and provide a place for visitation and reflection. Landscape features included the emplacement of two granite benches in front of the monument, selective vegetative plantings along the sides of the monument, and the installation of several stone markers along the periphery of the reinterment parcel. The stone markers are significant because they were discovered and salvaged from Potter's Field where they were used to delineate specific sections within the former cemetery. The original function and purpose of these stone markers has therefore been replicated in the reinterment cemetery.

Finally, and in keeping with the ecumenical service held at the beginning of the disinterment program, a special graveside service was performed at the Maple Grove Park Cemetery to dedicate the memorial monument and bless the deceased in their final resting place. The memorial service, led by several members of the local clergy, was held on Sunday, October 24, 2004. In attendance were representatives from the Turnpike Authority; The Louis Berger Group, Inc.; select members of the project team, including the mortician, monument designer, and cemetery president; living lineal descendents and friends of persons formerly buried at Potter's Field, including the Brule and Andriani families; and members of the press and general public (Plates 10-12 thru 10-14)

PLATE 10-12: Grave Side Blessings During Memorial Dedication Service

PLATE 10-13: Friends, Family, and Media at Memorial Dedication Service

PLATE 10-14: Andriani and Brule Family Members

B. PRIVATE REBURIALS

As a result of Berger's work, two sets of human remains were positively identified and returned to living lineal descendents who had long searched for these grandparents. Initially, both families provided information about their relatives who had once been laid to rest in Potter's Field. Using the families' recollections and photographs together with cartographic sources, artifact analysis, osteological examination, and an intensive review of the burial records and maps, Berger certified to the Court that substantial evidence existed to positively identify the remains of Alfonsina Pansini and Leonardo Andriani. Following court motions filed by the respective families, the Court authorized the transfer of remains to the morticians representing each family for the purpose of private reburial in accordance with the families' wishes.

After 75 years the remains of Alfonsina Pansini that were laid to rest in Potter's Field on August 20, 1928, were returned to her granddaughter and family on October 13, 2003. In accordance with the Court Order permitting the release of the remains to her family, Alfonsina's remains were transported to the Joseph Z. Konopka Funeral Home in North Bergen where they were prepared for a funeral mass at Saint Ann Roman Catholic Church in Hoboken held on October 14, 2003. The casket holding the remains of Alfonsina Pansini was then interred in the family plot (Plot E-Y-51) at the Holy Name Cemetery in Jersey City.

A second but equally poignant moment occurred when the remains of Leonardo Andriani were first viewed and later reclaimed by his grandson, who had been searching 23 years for his grandfather. Fifty-five years after his death, Leonardo's son and daughter, grandchildren, relatives, and friends were able to properly pay their respects. The Introcaso-Angelo Funeral Home in Jersey City, on behalf of the Andriani family, made arrangements for a mass of Christian burial at Saint Ann Roman Catholic Church in Hoboken on Saturday, November 29, 2003. This was followed by a procession of nearly 30 family members and friends, including representatives from the Turnpike Authority and Berger's Project Manager, who escorted Leonardo's casket to the interment site at Maple Grove Park Cemetery in Hackensack, the same cemetery where the unclaimed remains from Potter's Field are reinterred. At the private gravesite, a headstone had been erected bearing a photograph of Leonardo as a young man, the same photograph used by the archaeologists to assist in their identification (Plate 10-15). The inscription on Leonardo's headstone was taken from a Thomas Hood poem and read:

Peace and rest at length have come
All the day's long toil is past,
And each heart is whispering,
"Home, Home at last"

PLATE 10-15: Private Grave Site of Leonardo Andriani at Maple Grove Park Cemetery

CHAPTER 11. SYNTHESIS/FINDINGS/CONCLUSIONS

A. DEPOSITIONAL HISTORY OF SNAKE HILL BURIAL GROUND

1. Natural Surfaces and Modifications

The selection of the project area for a county burial ground in the late nineteenth century was based on its proximity to the county institutions at Snake Hill, and on its modest elevation above the wetlands that provided it with sufficiently drained soil for use as a burial ground. With the exception of Snake Hill and its smaller companion to the south, Little Snake Hill, the Meadowlands is a marsh formed in the drained basin of glacial Lake Hackensack. Snake Hill is an igneous pluton rising through the Newark shale basement rock and possesses little soil itself that could have served as a burial ground. The project area is a slightly elevated ridge at the extreme southern edge of the Secaucus heights and was one of the few areas of dry ground available to the county suitable for interring the deceased.

Initial historic land modifications in the project area involved plowing that almost certainly resulted in some degree of erosional leveling from runoff into the surrounding wetlands. Subsequent burial activities disturbed soils to greater depths than cultivation and further encouraged loss of sediment. Loss to erosion was somewhat counterbalanced by importation of a layer of imported soils over the burial ground in the early 1920s to create a second burial surface. Several episodes of substantial landscape modification followed the abandonment of Potter's Field and affected the integrity of the burial ground. Turnpike construction in 1950 involved driving bridge pier supports and importation of fill to support the Turnpike roadway. Burials were relocated by the Turnpike Authority to accommodate the pier installations but imported fill still overlies graves in an area thought not to contain burials in 1950. Construction of a detention center in the 1980s involved substantial excavations in the north-central portions of Potter's Field to level the construction site and to accommodate foundations for buildings and footings for security fencing. The excavation of two drainage ditches through the burial ground displaced and/or completely removed many graves. Installation of five, large concrete footings for an advertising billboard disturbed graves in the western end of Potter's Field. Final modifications to the burial ground landscape involved episodic dumping of waste soils, trash, and construction debris after the burial ground's abandonment.

2. Documentary Evidence for Modifications

The earliest depiction of the former Hudson County Burial Grounds is a *1907 Map of the county properties at Snake Hill*. The illustration includes no details of the burial ground boundaries or contour definition, settling merely for the label "Burial Grounds" as a point of reference. Descriptions of the local terrain in graphical form appeared for the first time on the *1841 Douglass Map of Hudson County*, in which the area north and east of Snake Hill, including the Potter's Field project area, was depicted as fast land surrounded by wetlands. The map depicts no structures or property lines though a boundary surrounding "high ground" is drawn uniformly and without details at the location of Potter's Field. The initial rendering of contour lines within the area of the burial grounds was on a 15-minute 1890 USGS topographic map which shows the land as a low peninsula rising little more than ten feet above the wetlands.

Topographic details of the landform containing Potter's Field are depicted on a 1931 survey of the county institutions at Snake Hill (Laurel Hill). The map depicts a narrow, 500 meter, southwest to northeast ridge elevated ca. 13 feet above surrounding wetlands. The southeastern slope of the ridge is shown falling away steeply to wetland while the northwestern slope exhibits a much more gradual decent. Though this is the earliest detailed map of Potter's Field it reflects a landscape already modified by plowing, grave digging, and filling.

An aerial photograph taken in 1950 shows the Potter's Field project area as it was just prior to the start of Turnpike construction and with the burial ground still in operation (Rob Plate 30). The county facilities at Snake Hill are plainly visible and a hand-drawn pencil line indicates the location of the proposed Turnpike center-line through the project area. Between 1946 and 1950 an average of only 46 people were interred in 20 graves per year. The scale of the photograph does not resolve individual graves or markers, but secondary vegetation covers portions of the burial ground that were no longer in active use. These vegetated sections include the entire north half of the burial ground, the extreme southern end, and isolated pockets through the mid-section. An area of lighter background color to the right (northeast) of the cemetery office may represent an active zone of interments and back-dirt piles. The long eastern edge of the burial ground seems to be rimmed by a drainage ditch connecting with a wet area traversed by straight drainage channels. The western edge of the burial ground is bordered by a dirt road. Using the ditch, road, and differences in vegetation, an outline of the burial ground can be discerned which closely matches the area encompassing the mapped graves excavated by the Berger team.

3. Archaeological Evidence for Modifications

The degree to which the modified surface recapitulates the original surface is unclear, but a measure of the depth and extent of fill can be arrived at by reference to various soil profiles. In Soil Profile 2 the interface between Stratum C and Stratum D is interpreted as the original burial ground surface based on soil types and the position of strata relative to the graves seen in cross-section (see Rob Figure 1; Rob Plate 29). Stratum C is described as reddish brown silty loam containing 15 percent broken stone and gravel. The angular, sheared nature of the inclusions characterizes the stratum as imported fill. Stratum D is a native reddish brown silty sand formed in glacial lake sediment of Newark basin shale.

Soil Profile 2 also depicts a cross-section of two burials, No. 951 and No. 11,197 which represent interments from the upper and the lower cemetery surfaces, respectively. The upper grave was placed almost directly over the lower grave, truncating it and leaving only the base of the lower grave intact. The outline of Burial 951 cuts through Stratum C, but does not truncate either Stratum A or B, indicating that the two upper soil horizons post-date the origin of the grave. The interface of Stratum B and Stratum C is thus interpreted as the cemetery grade at the time when Burial 951 was excavated for interments. An ash lens caps the grave and may represent regular disposal of stove ash from the cemetery office in areas of slumping graves.

Having concluded that the C/D interface represents the original cemetery grade and that the B/C interface is the latter grade, Stratum C is interpreted as the fill deposited over the first burial surface circa 1923. At this location the blanket of fill was rather shallow, measuring only about 47 centimeters thick, and may account for the deformation of Burial 11,197 by Burial 951. Judging from soil profiles taken elsewhere, however, the thickness of the circa-1923 fill is highly variable across the cemetery. Measuring 125 centimeters in thickness near the center of the cemetery in Soil Profile 3, the fill thinned to only 6 to 8 centimeters at the western edge of the burial ground in the vicinity of the brick office in Soil Profile 1. The fill layers in both Profile 1 and Profile 3 rest on top of brown sandy loam, interpreted as a plowzone (Ap-horizon) in place when burial activities began circa 1890. The absence of a plowzone in Profile 2 may be because it is on the south slope of the elevated landform too steep for agricultural purposes.

B. INTERMENT PATTERNING

Burial grounds are excellent examples of the concept of radiative growth: entities spreading outward from an initial core to occupy new space over time. Calculating the growth of burial grounds is made highly accurate by the presence of headstones, providing the means to track the progression of land use from their engraved dates. Depending on the shape of the property, the rate of burials, and the length of time in operation, a burial ground may appear to have spread in linear fashion, or in a sort of spiral, or sprouted as "colonies" in one or more new sections which may eventually join with the main body. The Berger team found no *in situ* grave markers at Potter's Field, so other lines of evidence were used to establish the trajectory of interments across time. The evidence included data from historic maps, information gleaned from recovered identities and artifact date ranges, the relative position of burials vis-a-vis the surface fill, and the shape of the burial ground landform.

In brief, the Potter's Field interments started in the southwest of the property circa 1880 (now under the Turnpike) and progressed to the northeast until 1923, beginning again in the southwest in imported fill and proceeding northeastward until interments ceased in 1962.

1. Historic Maps and Landform

Two Hudson County Engineering Department maps, dated 1935 and 1941, depict the western portion of Potter's Field divided into numbered sections (1 through 12) differing in size and shape. More than 800 individual numbered graves are depicted on the maps. The order of numbered graves within sections is not spatially sequential, but the dates of use of the sections, derived from the Burial Record, generally proceeds from early in the southwestern Section 1 to later in the northeastern Sections 11 and 12. The graves depicted on these two maps were interred between 1923 and 1941. Hudson County Engineering Department Map 769, revised in 1928, depicts burials in the extreme northeastern portion of Potter's Field dating between 1916 and 1923. No maps were found depicting graves dug prior to 1916 or after 1941.

2. Dated Artifacts and Recovered Identities

The ability to match skeletal remains with the burial records through osteological analysis and mapping data allowed a more precise description of the burial sequence at Potter's Field. Because of the vagaries of organic preservation, few matches were made either prior to 1900 or after 1939, leaving the patterns of land use for the earliest and latest interments underdetermined. These gaps in the burial ground sequences due to poor skeletal preservation can be partially filled by the information derived from the artifact analysis and in particular the date ranges of certain items. Coins were useful in establishing earliest-possible dates for undisturbed but poorly preserved burials. In one example, a group of eight burials that were isolated from the main burial ground, west of the cemetery office (Burials 1,112 to 1,119) could not be matched to burial register entries and did not appear on historic maps. Few artifacts were recovered from this group, but a 1944 U.S. penny from Burial 1,112A dates that burial, and probably the entire group, to no later than 1944.

C. MORTUARY PRACTICES

The term *mortuary practice* refers to a range of traditions, actions, and forms that are manifest in the treatment of the dead. These practices focus on four elements; 1) the body, 2) the coffin, 3) the shaft, and 4) the grave marker. The treatment of the body includes such details as embalmment, burial position, burial clothing, and inclusion of personal effects. Burial position refers to the overall layout of the body as well as to the placement of arms and hands. Elements of coffin shape and design are important referents in mortuary practices. Coffin shapes exhibit regional, ethnic, and chronologic trends that reflect not just traditions in the coffin-makers craft, but also attitudes about the meaning and display of death. Construction materials and coffin hardware, rather than merely technical responses to design problems, came to personify the social status of the dead and were expressions of class, rank, and status. Shaft orientation in eighteenth and nineteenth century burial grounds reflected religious traditions, while the marker was evocative of socioeconomic class and social trends current in popular culture.

1. Documentary Evidence

Embalming is a procedure that retards the process of organic decomposition after death and has been practiced in various forms since Egyptians first mummified their nobles circa 3500 BC. Modern embalming dates to the American Civil War (1861-1865) when methods using arsenic were employed to delay decomposition of deceased soldiers until their remains could be shipped home. By the late 1880s a standard arsenic-solution had become the primary technique of embalming and had spread across the United States and Canada. Effective at retarding decomposition, arsenic is also highly toxic and gradual awareness of the health risks to morticians, cemetery workers, and doctors resulted in its elimination as an embalming agent by 1910 (Konefes and McGee 2001:127). A formaldehyde solution was found to work as well as arsenic and with less danger to the handlers, and after 1910 it became the preferred embalming compound.

The Hudson County Burial Registers contained no information relating to burial position. The majority of Euro-American burials in the archaeological literature are recorded as being in an extended position (Kenny et al 2003, LeeDecker 1995, Little et al 1992). The positions of arms and hands can vary among four basic postures: crossed over pelvis, crossed at waist, folded on chest, and clasped at pelvis.

Expectations about the recovery of burial clothing were generally informed by the characterization of Potter's Field itself, that is, as a burying ground for the poor, unnamed, and unhealthy. In general, the interred were wards of Hudson County and the county could be relied on to have spent only the minimum necessary to prepare and bury the individual. Within this context, then, burial clothes were expected to be little more than linen shrouds fastened by straight pins. On much the same grounds, it was anticipated that very few personal effects would be recovered from burials at a pauper's cemetery. Individuals interred in a county burial ground, primarily indigent and homeless, would be unlikely to retain many possessions at the time of their death. It also was assumed that any valuables in the possession of the deceased would have been claimed by the families or stripped by institutional fiat or by custom.

Coffin design in America was derived from European traditions and the most common form was hexagonal. The hexagonal coffin form was used throughout British colonial America and remained in use until the middle of the nineteenth century, when it was largely replaced by a rectangular form (Bell 1990, Kenny et al 2003, LeeDecker 2001). While early American mortuary practice emphasized the absence of ornamentation on coffin design, people of means began adorning coffins with tin, pewter, or lead hardware by the late eighteenth century (LeeDecker 2001:10). Coffin hardware, often quite ornate, became commonplace by the mid-nineteenth century but was not limited to the upper ranks of society, for mass-production had made these items inexpensive and accessible to all socioeconomic classes (Bell 1990:55). Glass viewing plates became an element of coffin design in the second half of the nineteenth century in response to the 'beautification of death' movement which transformed the burial rite into a pageant replete with protracted and very public mourning (Mitford 1963).

The orientation of a shaft was important in terms of the eternal view imparted to the interred. Traditional European-Christian practice dictated an east-west orientation so that the individual would face the rising sun, a symbolic gesture to the resurrection of Jesus from the east. Jewish graves commonly point toward Jerusalem and Muslim graves to Mecca. North American Christian cemeteries dating from the eighteenth century and the first half of the nineteenth century typically were arrayed in an east to west orientation (Kenny et al. 2003, LeeDecker 2001, McKillop 1995). Shaft orientation in later cemeteries was usually orthogonal to the street, affecting a more efficient or rational approach to cemetery maintenance and plot allotment. Grave markers, or head stones, have long been viewed by archaeologists as specially endowed with information related to ideology, class, and status (Deetz 1977, Deetz and Dethlefsen 1978, McGuire 1988). The material, design motifs, and text all contribute to the personification of the individual within a specific socioeconomic context.

2. Archaeological Evidence

a. The Body

The date range of burials at Potter's Field, circa 1895 to 1962, suggests that arsenic was used on the burial population until the early 1900s, assuming that embalming was performed at all. Soil borings of the project area prior to the initiation of fieldwork yielded low background values for arsenic, which may represent arsenic leaching into the soil from burials, although this is an equivocal conclusion. The mean value of arsenic in the ten boring samples was 5.6 parts per million (ppm), far less than a reading of 28,000 ppm recently measured from tissue samples of a Civil War soldier (Konefes and McGee 2001:131). Bone tissue was not tested for arsenic or any other substance at Potter's Field.

More substantial evidence of embalming at Potter's Field came in the form of glass bottles embossed with the words 'Embalming Fluid' recovered from 18 burials dated between 1923 and 1933 (see Chapter 8). Embalming fluids used within this date range were composed of formaldehyde solutions. The placement of empty embalming fluid bottles in coffins is somewhat puzzling given the generally respectful treatment of the Potter's Field deceased by the cemetery administration, but it permits a glance at a mortuary practice that would be difficult to discern by other means. It is difficult to extrapolate the full measure of embalming at Potter's Field from only 18 known cases, but it appears likely that it was a standard procedure given its universal prevalence among Christian burial traditions in the twentieth century.

The burial position of arms and hands was not specifically collected as a data field, but observations taken during disinterment revealed that the vast majority of burials sufficiently complete to identify, were laid out with hands clasped over the pelvis.

Burial clothes found on the interred were surprisingly varied and ubiquitous; 1,726 burials yielded clothing or clothing fragments. The most common identifiable item was buttons, followed by shoes, and coat or coat fragments. Among the garments found were pants, stockings, belts, dresses, shirts, and hats. Many undetermined clothing fragments were recovered, but no burial shrouds were identified. The inclusion of personal effects of the deceased is often referred to in the archaeological literature as 'grave goods,' and is meant to celebrate the individual, provide them with apparatus for the journey to the afterlife, or be representative of the social status of that person (Ritchie 1980:177).

The thousands of identical white porcelain or pressed-glass buttons found in burials across the burial ground are interpreted as remnants of institutional garb issued to inmates of the hospitals, almshouse, and asylum (see Chapter 8). The high frequency of their recovery suggests that many individuals were buried in standard-issue garments.

As the 'beautification of death' movement gained popularity in the nineteenth century, the positioning of the body on brocade drapery with the head resting on a silk or satin pillow (or some combination thereof) became an important expression of the mourning ritual in middle class and upper class society (Stannard 1980). No such finery was recovered at Potter's Field, but a curious sort of pillow in the form of a common red brick was found in some eighty burials dated between 1909 and 1918. Most often found beneath the skull, but in a few instances displaced to the side, a brick was used to prop up the head not as a cushion for the 'long sleep' but rather, it is suggested, to keep the mouth from opening in a macabre grin (Jeff Macanka, Funeral Director, personal communication 2003).

b. The Coffin

Coffin form at Potter's Field illustrates an interesting reversal of the national trend from hexagonal to rectangular shapes beginning circa 1850. While fully half the Potter's Field burials contained coffins that were either completely decomposed or sufficiently so to obscure their form, among identifiable coffins 57 percent were hexagonal, 30 percent rectangular, and 12 percent were tapering. This is surprising given the late-nineteenth and early twentieth century context of the burial ground, when the hexagonal coffin form was waning in popularity across the United States. Not only did the hexagonal form predominate at Potter's Field but preference for that design persisted well into the twentieth century. Among identifiable coffins that could be matched to dated entries in the burial register, the hexagonal form actually increased from 48 percent of coffins in the 1910s to 63 percent during the decade of the 1920s. Not until the 1930s did the rectangular coffin shape match the frequency of hexagonal coffins.

The coexistence of the three basic coffin forms and the persistence of the hexagonal coffin form may say as much about the coffin-maker's tradition at Potter's Field as it does about the class, status, or rank of the individuals for whom the coffins were made. A test of relationships between coffin forms and social distance indicated that gender was not a significant factor in the choice of form (χ^2=1.56, dof=2, $p \leq 1$). The test between coffin forms and institutional setting, however, revealed significant relationships. When interments from the county institutions (the almshouse, asylum, hospitals, and penitentiary), were paired against interments from non-institutional sources (local morticians and municipalities) chi-square tests yielded significant differences between the distributions for rectangular and hexagonal forms (Table 11-1), and between hexagonal and tapering forms (Table 11-2). A paired test between rectangular and tapering coffin forms yielded a result that was not significant (Table 11-3), suggesting there was only random difference between the distributions of these two forms. Overall, the chi-square tests generated results indicating that hexagonal coffin design was closely related to institutional interments, rectangular and tapering designs with non-institutional interments.

TABLE 11-1
CHI-SQUARE CONTINGENCY TABLE FOR
RECTANGULAR AND HEXAGONAL COFFIN FORMS

	Rectangular Coffin	Hexagonal Coffin
Institutional Interments	36	163
Non-Institutional Interments	81	62

Degrees of freedom:1
Chi-square=54.95
$p \leq 0.001$
The distribution is significant.

TABLE 11-2
CHI-SQUARE CONTINGENCY TABLE FOR
HEXAGONAL AND TAPERING COFFIN FORMS

	Hexagonal Coffin	Tapering Coffin
Institutional Interments	163	21
Non-Institutional Interments	62	34

Degrees of freedom:1
Chi-square=23.03
$p \leq 0.001$
The distribution is significant

TABLE 11-3
CHI-SQUARE CONTINGENCY TABLE FOR
RECTANGULAR AND TAPERING COFFIN FORMS

	Rectangular Coffin	Tapering Coffin
Institutional Interments	36	21
Non-Institutional Interments	81	34

Degrees of freedom:1
Chi-square= 0.93
For significance at the 0.05 level,
chi-square should be greater than or equal to 3.84.
$p \leq 1$
The distribution is not significant.

The results of the paired contingency tests are important in understanding mortuary practices at Potter's Field because they disclose fundamental differences in design traditions between coffin-makers employed by the county institutions and those in the employ of local morticians and municipalities. Although burial frequencies at Potter's Field ranged between 100 and 200 per year from 1881 to 1935 and exceeded 200 in four separate years, these numbers were probably insufficient to keep busy a full-time coffin-maker. It is more likely that the carpenters in the wood shop at the Hudson County facilities on Snake Hill doubled as coffin makers, on an as needed basis, to make coffins for the institutionalized deceased. Yet the persistence of the hexagonal coffin shape suggests either that the cadre of carpenters at Snake Hill had a shared tradition over a long term, perhaps reflecting cultural transmission through a small multi-generational family unit or that a simple standard template persisted in the wood shop. The continuity of craftsman skills across generations was a common feature of life in the nineteenth century and was still visible through the twentieth century. This was steady work but it had no need to be responsive to market forces and changes in consumer style, accounting perhaps for the persistence of a single coffin form. For these artisans, the client was not the family of the deceased but rather the county, which had no vital interest in keeping up-to-date with current mortuary fashions.

The undertaking business, on the other hand, was highly competitive with as many as 32 morticians listed in the county directory in 1881 (Gopsill 1881:445), 65 in 1900 (Boyd 1900:888), and 75 in 1922-23 (Polk 1922:2010). These businesses had every reason to adjust to changing patterns of consumer trends in an effort to remain competitive in a crowded field. Local morticians prepared a number of individuals for interment at Potter's Field, accounting for 706 register entries, or 7.5 percent of the burial total at the Hudson County Burial Grounds. The morticians either had a ready-stock of inexpensive or simple coffins or contracted with a local coffin maker when necessary. The coffin makers would have been versed in the current fashions of mortuary style and would have produced coffins replicating those modern styles. To these artisans, preserving old traditional styles was just not economically feasible as it would have meant resisting the tide of market forces.

In much the same way as burials handled directly by morticians, the large number of individuals brought to Potter's Field by the municipalities of Hudson County would have been delivered in plain, inexpensive coffins manufactured by coffin makers producing modern style coffins. It is likely that the municipalities relied on the same craftsman who supplied coffins to the undertakers, and in so doing delivered the unknown or indigent deceased to Potter's Field in simple but stylistically modern coffins.

A point about the tapering coffin form is included here. A distinct minority design form, it declined in popularity from 1900 through the 1930s. Its similarity to the distribution of the rectangular form and dissimilarity to the hexagonal suggests that tapering coffins were a variant of the former rather than of the latter. The tapering shape appears to have been in the design repertoire of both institutional and non-institutional coffin makers, but was more commonly constructed by the latter group of artisans.

Through this analysis the pattern of coffin forms at Potter's Field can be seen as having developed from two very different realms of craftwork; at one pole was a small group of artisans working in traditional styles unaffected by market forces and trends, while at the other pole were private enterprises involved in a dialectic with the public about current fashions and styles.

c. The Shaft

The overall orientation of graves at Potter's Field did not conform to traditional Christian cemetery patterns despite overwhelming evidence of Christian iconography recovered from many of the interments, nor did the orientation align with New County Road which in any event was fairly removed from the main body of grave shafts. The median shaft orientation, however, was nearly perpendicular to the bearing of the burial ground landform. While there appears to have been few practical or symbolic reasons for the choice of shaft orientation, once made, the pattern persisted for the remainder of the burial ground's operational use.

At Potter's Field the general trend of shafts was in a northwest to southeast orientation – head to feet respectively. The early burials from circa 1890 to 1910 exhibited a median shaft orientation of 310 degrees from magnetic north. Between 1910 and 1923 the orientation shifted slightly to the north, registering a median angle of 330 degrees. The later or upper burial surface, used between 1923 and 1962, maintained the median orientation of 330 degrees. Approximately two percent of burials were placed with the head to the south, or southeast.

The Burial Register indicates that during the first twenty years of the burial ground's operation most of the interred were buried in individual grave shafts. The first recorded grave with multiple burials was Lot 323 on May 6, 1883 but it was still common until after 1900 for the deceased to be buried one-per-grave. The trend toward multiple use of a single grave increased from an average of 1.05 interments per grave in the 1880s, and 1.22 interments per grave in the 1890s to 2.07 interments per grave in the 1900s. It was not until 1903 that the average number of interments per grave exceeded two (2.53). Lone burials did occur sporadically throughout the 82 year period of use of the burial ground (see Chapter 7 , Table 7-3).

While multi-use grave shafts are a common practice in European cemeteries where land is scarce, they are relatively rare in the United States with the exception of publicly financed potter's fields. Cemeteries have come to reflect closely held American values of private property, with the purchase of plots restricted to use by an individual or close family member. Interment with others in a single shaft, particularly with strangers, is thus an expression of low socioeconomic status in the United States precisely because it signifies the inability to acquire a plot even as small as a grave. To paraphrase Scarlet O'Hara's father, 'A man is nothing without land' (Mitchell 1936).

d. The Marker

Based on the historic records and maps, the Hudson County Burial Grounds utilized wooden head boards and ceramic cylinders with imprinted numbers to designate burial shaft locations. No grave markers were recovered in association with any burials at Potter's Field. No wooden head boards nor remnants of these markers were discovered during Berger's disinterment of Potter's Field. Approximately two dozen numbered ceramic cylinders, however, were found cached in three separate locations within old backfilled trenches and are interpreted as grave shaft markers which correspond with the numbered entries in the Potter's Field burial register.

D. EVIDENCE OF POST INTERMENT DISTURBANCES

The Potter's Field burial ground has suffered a number of impacts during its history from small-scale activities such as animal burrowing to the major construction associated with the detention center and Turnpike, each contributing to the disturbance and sometimes the displacement of burials. Some of the disturbances to the burial ground were documented at the time of the activity, but the majority were either unintended or unknown. This section discusses the various types of recorded and archaeologically discerned disturbances, their extent, and the effects of those actions on the exhumation of burials and the recovery of identities.

1. Documented Disturbances

The Hudson County Burial Register records 306 burial disinterments by local undertakers for transfer to the families of the deceased. Most disinterments were carried out within one or two months of the burial date, some as late as two years after initial interment. In a few instances many years lapsed between burial and removal. John McGovern, buried in 1938 was disinterred in 1946, while Mary Schon, an asylum patient, was buried in 1934 and disinterred 18 years later in 1952. During such lengthy intervals a great deal of organic decomposition, coffin decay, and shaft slumping would have occurred rendering the complete recovery of the deceased difficult, particularly if occupying the bottom position within a grave shaft. Removal of bottom burials in such circumstances would have severely impacted the top burial, and it is equally likely that some disturbance would have occurred to bottom burials even with the disinterment of a top burial. The reasons for disinterment were not generally listed, though one may assume that families had lost contact with the individual and were unaware of their death for a time. A few entry notations read 'buried by mistake,' which probably refers to an administrative error when the deceased was not immediately released to the family.

A second set of recorded disinterments refers to the removal of 84 individuals by the mortician C.J. Rieman for the Turnpike Authority in November 1950 prior to construction of the Turnpike bridge piers (see Chapters 4 and 7). Representing individuals buried between 1923 and 1931, these disinterments were noted in the Burial Register and were re-interred in a 'reburial plot' located immediately adjacent to the then active burial ground (see Figures 7-12 and 7-18). An effort was made by Rieman to retain the identities of the individuals during re-interment by placing small lead name plates with the remains. However, the two decades and more that the burials resided in the ground were sufficient for extensive decomposition, and several sets of human remains with single name plates were actually multiple individuals resulting from the co-mingling of bones due to the collapse of shaft fill and decomposition of the wooden coffins. Therefore, some of the re-interred remains were unidentified.

2. Archaeological Evidence

a. Natural Disturbance

All organic matter decomposes eventually unless inhibited in frozen, desiccated, or de-oxygenated environments. Untreated pine coffins decay rather rapidly in soils of the northeastern United States and the result is the collapse of the burial tiers within a shaft and the ensuing slump of shaft fill. In this fashion most of the burials at Potter's Field suffered some disturbance in the form of co-mingling with shaft mates and the minor displacement of skeletal elements from the deformation of the shaft. Other natural post-depositional transformations of archaeological sites include root activity and tree falls, insect and animal burrowing, and freeze/thaw cycles (Butzer 1982:104-114). All of these processes would have had some impact on the preservation and primary positioning of human remains, coffins, and buried personal effects. For example, a rodent burrow was observed through the shaft in Burial No. 1,028A (see Figure 7-8) and may have caused the rotation of the skull and displacement of the right humerus.

The naturally high water table in the Meadowlands, particularly the oscillating character of the local hydrology has affected the burial ground in fundamental ways. Essentially, the soil horizon containing the burials was divided into three hydrologic layers. The lowest layer tended to be perpetually wet creating an anaerobic environment in which wood, bone, and other organic materials were well-preserved. Despite the high degree of organic preservation, the skeletal elements of some interments such as Burial No. 512B were disarticulated and displayed some dispersal within the intact coffin. Although bone does not float, the tidally influenced hydrology may have generated sufficient kinetic energy to translocate the remains. Cupric and ferrous artifacts in this zone typically were poorly preserved.

A middle hydrologic layer was subject to cyclically wet conditions producing the highest level of organic decomposition. Most of the burials that were characterized as indeterminate for gender and age were recovered from this zone. Finally, the upper hydrologic layer was a dry zone, with good to excellent bone preservation but very poor preservation of coffin wood. Personal effects tended to be better preserved in this upper layer, with clothing surviving intact even when coffins had completely decomposed.

b. Human Disturbance

Presumably, unintended disturbance to a minimum of 64 individuals was evinced by the presence of a bone pile referred to as Cluster No. 1 that was discovered under the Turnpike bridge (see Chapters 7 and 9). The level of disturbance to these burials was severe, resulting in the loss of most small skeletal elements, all potential personal effects, all evidence of coffins and shafts, and most importantly any possibility of establishing the identities of these individuals.

A second episode of major construction impacts to Potter's Field occurred during the construction of the former Hudson County Detention Center in the 1980s. Impacts to the ground surface and underlying burials occurred during preliminary site grading, building construction and fence erection, and drainage ditch excavation. All of these activities resulted unrecorded destruction of human remains and burial shafts. To investigate the extent of possible disturbances to intact deposits, a 12-meter (40 feet) soil profile was exposed between the detention center facility blacktop and the drainage ditch (see Figure 7-5). The profile showed clear evidence of extensive disturbance in the form of cut and fill activities that resulted in large-scale re-working of soils (see Figure 7-9). Major soil strata exhibited a 25 degree dip across much of the profile, reflecting the trend of the original ground surface onto which the displaced fill had been pushed. Small bone fragments, clothing, and pieces of coffin wood were identified throughout the disturbed zone.

Disturbance was most extensive in the vicinity of the drainage ditch that created large gaps in the burial pattern in the northeast and center of Potter's Field (see Figure 7-12). With construction occurring more than two decades after the closure of the burial grounds there was no extant cemetery administration to oversee the work. Whether the contractor(s) who actually performed the work had any prior knowledge of the existence of the burial ground is unknown. However, it would seem highly unlikely that they were unaware of the human bones being exposed by their machinery. Unlike the Turnpike's 'reburial plot', the Berger team found no evidence of re-interred remains associated with the detention center construction.

A similar example of construction disturbance was the installation of a thirty-foot-tall billboard alongside the Turnpike at the western edge of Potter's Field during the 1970s. Five concrete footers that supported the structure intruded directly through burial shafts, and again, no record was made of disinterments from the affected area. Berger interprets the existence of truncated shafts and the absence of recorded re-interments as evidence of the lack of any attempt to repatriate the dislocated human remains.

The final known set of impacts to Potter's Field was the episodic dumping of fill which was allowed to occur after the burial ground was abandoned. Whether any or all the dumpings were authorized is unknown at this time. Evidence from Berger's disinterment activities indicate that the burial ground surface was covered with between three and six feet (one to two meters) of fill across its entire extent. Although the fill soil itself did not intrude into burial shafts in the way that construction impacts did, the action of repeatedly driving trucks on the burial surface to dispose of fill must have severely compacted shaft soils leading to the deformation and disturbance of skeletal remains.

E. BURIAL POPULATION RECONSTRUCTON

The demographic structure of a burial population reflects the social structure of the group(s) from which the interred originated. Depending on the breadth of the arriving population, a cemetery may assume a variety of demographic profiles. For example, a military cemetery should yield a significantly narrower profile with regard to gender and age than a church cemetery, yet may display a broader racial composition. The disinterment program at Potter's Field was an opportunity to assess the health and demographics of a large burial sample drawn from a population that has been little studied in the archaeological literature. What is known about these people derives largely from what they all share in common - burial in a pauper's cemetery. Originating from the almshouse, asylum, penitentiary, and infectious disease facilities, one might be inclined to characterize the population as indigent, unhealthy, or criminal. Yet these are overly broad generalizations at best and without evidentiary support cannot be used to construct an accurate profile of a burial population.

1. Documentary Evidence

The Hudson County Institutional Complex at Snake Hill maintained a set of Burial Registers for interments in the three Hudson County Burial Grounds that detailed the name, age, and gender of the deceased (when known), the date of burial, and the place of death. This last category indicated (1) the institutional setting where death occurred, or (2) the municipality or mortician/undertaker responsible for transporting the deceased for burial. An institutional listing sometimes could be interpreted as the cause of death, such as entries from the smallpox hospital or tuberculosis hospital. Between 1880 and 1962 the cemetery administration recorded 9,781 interments in the Hudson County Burial Grounds, of whom 1,706 or 17 percent were unidentified at the time of interment.

The accumulation of death records over an 82 year period permits a long-range approach to the analysis of burial population dynamics by the way of gender, age, and institutional setting. There are, however, some limitations to this data set. For instance, gender identifications were unknown for 940 individuals, or 9.6 percent of the total. Another serious gap in the records occurred in the early 1930s, when the age of the deceased was gradually eliminated as a vital statistic. The fidelity with which this data field had been collected for over fifty years and its elimination in a short span suggests that an administrative or legislative edict was responsible for the change. The lack of age data post-1934 is unfortunate because the Hudson County institutions located at Snake Hill (almshouse, asylum, penitentiary, isolation hospitals) were undergoing important structural changes in the years around World War II, and the absence of mortality curves from this period obscures the forms those changes took. However, 90 percent of burials occurred between 1881 and 1939, so the vast majority of burial entries have an associated age.

a. Origin of Burial Ground Population

The various institutions operated by Hudson County at Snake Hill included an almshouse, asylum (originally termed the lunatic asylum, then insane asylum, and finally mental disease facility, the name of this institution tracked the changes in social perceptions of mental illness), penitentiary, small pox hospital, tuberculosis hospital, and general county hospital. Each of these facilities contributed individuals for interment at one of the three Hudson County Burial Grounds, including Potter's Field. Table 11-4 presents data on the institutional composition of the Hudson County Burial Grounds. One of the noteworthy results of the origins of burial population tabulation based on the Burial Register is that only about 55 percent (N=5,351) of the burial population derives from Hudson County institutional complex. The remaining 45 percent or 4,430 individuals were brought to the Hudson County Burial Grounds by morticians or identified as having died in one of the various towns/municipalities or hospitals within the County (i.e., Jersey City, Hoboken, Bayonne, Jersey City Hospital, etc.). Specifically, the towns/municipalities contributed approximately 37 percent or 3,583 individuals to Hudson County Burial Ground. Based on this information, individuals who died throughout the County and were either unidentified or without financial assets to be buried in private cemeteries were offered interment space within the County's Burial Ground at Snake Hill. As such, it can be concluded that the Hudson County Burial Ground was one of the various facilities operated by the County at Snake Hill for use by all County towns/municipalities and residents. In this regard, the Hudson County Burial Ground was by definition a 'potter's field" or pauper's cemetery.

TABLE 11-4

ORIGIN OF HUDSON COUNTY BURIAL GROUNDS POPULATION

INSTITUTIONAL BURIALS		NON-INSTITUTIONAL BURIALS			
ORIGIN	FREQUENCY (%)	ORIGIN	FREQUENCY (%)	ORIGIN	FREQUENCY (%)
Almshouse	3323 (34.0)	Morticians	736 (7.5)	North Bergen	48 (0.5)
Asylum	905 (9.2)	Jersey City	2330 (23.8)	Kearny	28 (0.3)
Isolation Hospital	554 (5.7)	Hoboken	770 (7.9)	Secaucus	24 (0.25)
County Hospital	472 (4.8)	Bayonne	137 (1.4)	West New York	24 (0.25)
Penitentiary	97 (1.0)	Union City	99 (1.0)	Other Towns	54 (0.6)
		Harrison	70 (0.7)	Various Others	110 (1.1)
Grand Total	**5351**	**Grand Total**	**4142**	**Grand Total**	**288**

b. Burial Frequency

Perhaps the most striking feature of the Hudson County Burial Grounds population is the preponderance of males. Of those burials with identified gender (N=8,841), 76.4 percent were male, a ratio greater than three to one. In the first twenty years of burial ground operations the male to female ratio was about two to one, and over the next four decades that ratio became increasingly one-sided, eventually reaching more than five to one in favor of males by the 1930s. Surely a great deal of the gender imbalance is due to the large number of unmarried immigrant men who came to the New York City metropolitan area in the nineteenth century and early twentieth century in search of work. Table 11-5 presents the breakdown of interments within the Hudson County Burial Grounds by gender and decade.

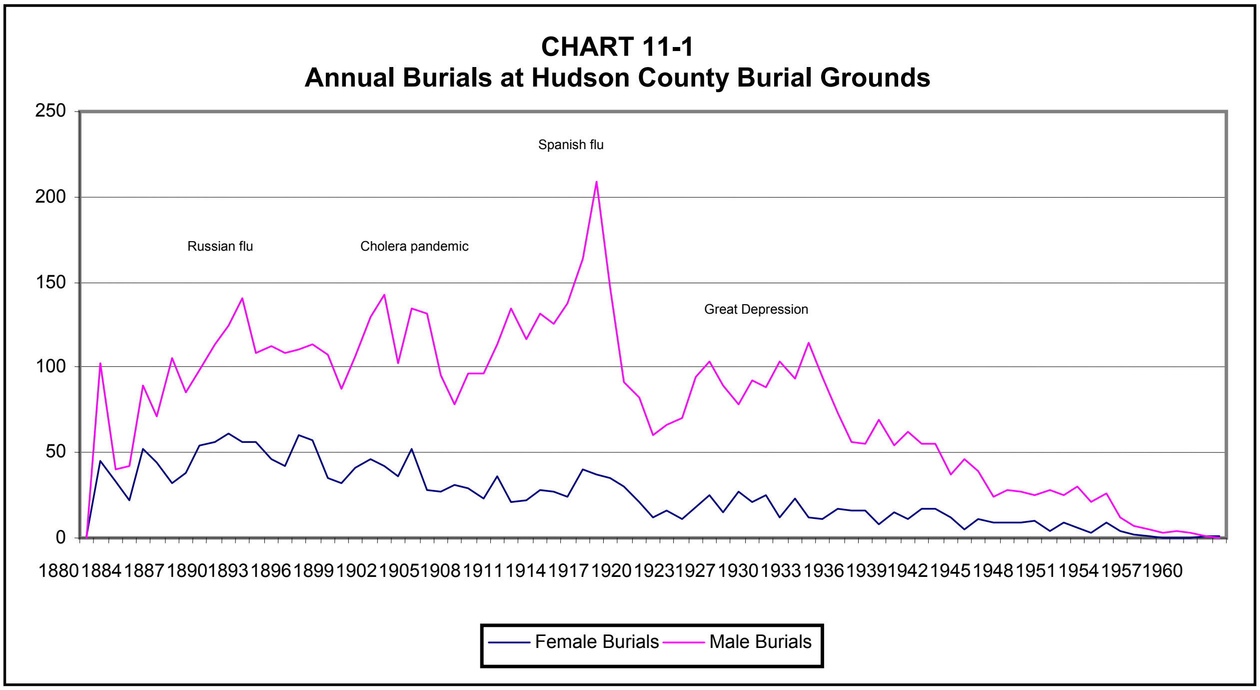
TABLE 11-5

HUDSON COUNTY BURIAL GROUNDS, INTERMENTS BY GENDER AND DECADE

Decade	Female (%)	Male (%)	Undetermined (%)	Total	Female:Male Ratio
1880s	372 (28.6)	719 (55.3)	209 (16.1)	1300	1:1.9
1890s	513 (29.7)	1146 (66.4)	67 (3.9)	1726	1:2.2
1900s	365 (22.6)	1149 (71.1)	102 (6.3)	1616	1:3.1
1910s	315 (16.9)	1454 (78.1)	93 (5.0)	1862	1:4.6
1920s	196 (17.6)	875 (78.5)	44 (3.9)	1115	1:4.5
1930s	161 (13.7)	841 (71.4)	176 (14.9)	1178	1:5.2
1940s	115 (17.5)	406 (62.0)	134 (20.5)	655	1:3.5
1950s	39 (12.6)	169 (54.5)	102 (32.9)	310	1:4.3
1960s	2 (10.5)	4 (21.1)	13 (68.4)	19	1:2
Totals	2078 (21.3)	6763 (69.1)	940 (9.6)	9781	1:3.2

The pace of burials indicates rapid growth from the 1880s through the 1910s, followed by a leveling off for two decades, and then rapid decline over the final twenty-some years of operations at the burial ground. The graph of annual burials illustrates many peaks and troughs partly reflecting epidemiological history, and in part management decisions taken by the county with regard to its Snake Hill institutions (Chart 11-1).

Four major peaks have been identified from 1891-1892, 1901-1905, 1916-1918, and 1933. Although death rates are influenced by multiple disease vectors and social factors, historic pandemics can be traced to periods around the years delineated for the first three peaks. The Russian influenza strain began in 1889 in Russian and Central Asia and soon affected Europe and elsewhere (Encarta 2004). Immigration from Eastern Europe may have spread the outbreak to North America by 1891-1892, accounting for the spike in deaths. Cholera is a highly virulent infectious disease exacerbated by poor sanitation. The so-called 'sixth pandemic' began in Russia in 1899 and may have followed the same route as the Russian flu, finding the overcrowded tenement housing of immigrant laborers a suitable breeding ground during the second burial peak (Wikipedia 2004). The last cholera outbreak in the United States was in 1911. The third and most prominent peak includes the great Spanish influenza pandemic that killed millions



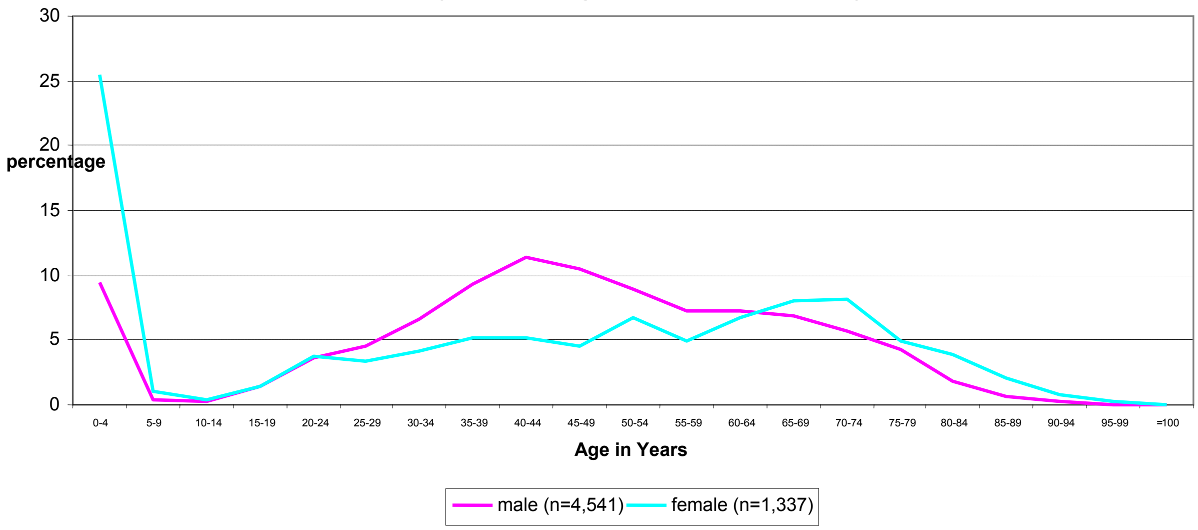
worldwide in 1918, although the greatest frequency of Hudson County Burial Ground interments occurred in 1917, prior to the outbreak of that particular flu strain (Stanford 2004). Because of the hyper-virulence of the Spanish flu its appearances were well noted, and an outbreak in Hudson County in 1917 would have been unlikely to have gone unreported. Still, flu-like deaths were common notwithstanding the pandemics, and were variously recorded as croup, pneumonia, or congestion of the lungs in the county health statistics (Shaw 1884:1116-1117). The final peak, smaller than the other three in absolute terms, but high relative to the several years either side of it, is set at the height of the Great Depression (1929-1940) and may reflect the health stresses placed on under-employed wage workers by the extended economic downturn. Access to adequate health care was often difficult for this social group in the best of times, but four years of the Great Depression would have presented extreme challenges to satisfy basic needs of diet, shelter, and medical attention. While economic circumstances certainly appear to have put the general population at greater health risk during this period, the increase in burials at the Hudson County Burial Ground may have been simply the product of a heightened inability to pay for burial plots in private cemeteries.

Comprising about 21 percent of the documentary sample, the female burial population displayed a somewhat different trajectory from that of the male interments. Elevated rates of female burials occurred in 1890-92, 1896-97, 1904, and 1916-18. Interestingly, the burial rates for the period 1916-18, which among males were nearly fifty percent higher than any other period, were one-third less than the peaks recorded in the 1890s for females. Nearly absent were any significant increases among women during the Great Depression. Although the economic crisis affected both men and women, a decline in marriage rates meant that more women were staying with their parents and relatives and were not bearing children, cushioning somewhat the impact of hard times.

c. *Age Structure*

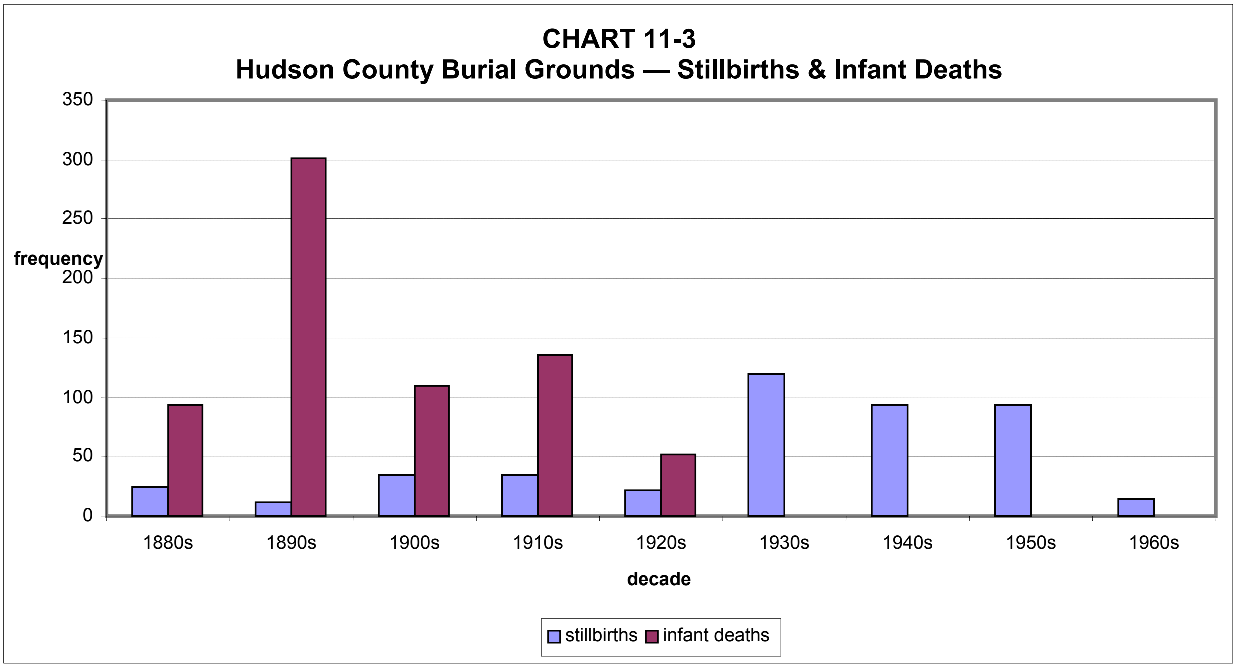
Mortality curves generated from the burial records can describe various aspects of a burial ground's demographic profile (Ubelaker 1999). Of particular note in the Hudson County Burial Grounds is the variance in infant mortality between genders, with the girls registering more than two and a half times the rate of the boys (Chart 11-2). The differing rates of infant mortality may be more the product of social attitudes than of purely epidemiological factors affected by gender. Such attitudes may have included differential access to health care based on cultural preferences for male children, or the custom by some mothers of retaining custody of their infant girls within institutional settings thereby exposing them to a greater variety of life-threatening illnesses. In 1875, New York State passed the Children's Act which ordered the removal from poorhouses of all children between the ages of 2 to 16 (Katz 1996:107). Many other states followed suit in the following decade, but the very young were allowed to remain with the mother.

CHART 11-2
Hudson County Burial Register Data — Mortality Curves



Male mortality rates overtook rates of females from age 30 to about 60, reflecting the often hazardous working conditions for what was largely an underclass of wage laborers. Work-related accidents and illnesses due to industrial processes and the absence of safety procedures were prevalent during this period. Adult death rates peaked between the ages of 20 to 50 in Hudson County in the late-nineteenth century, representing the years of prime employment opportunities (Shaw 1884:1116). One consequence of greater middle-age mortality among men was relatively higher survivorship into old age for women.

Stillbirths and infant deaths comprised over 12 percent of the register entries at the Hudson County Burial Grounds, yet their trajectories were quite distinct (Chart 11-3). The frequency of stillbirth burials jumped sharply beginning in the early 1930s and fully 96 percent of all stillbirths arrived at the Hudson County Burial Ground from non-institutional sources. Infant burials exhibited a reverse trend, declining from more than 300 in the 1890s to about 50 in the 1920s. Because of the discontinuance of age data in the burial records post-1934, the full profile of infant deaths from circa 1930 to 1960 is unclear. However, more than 63 percent of infant burials originated in the almshouse, supporting the notion that many young girls remained with institutionalized mothers. Although improved medical care over that period may account for much of the drop in infant deaths, the opposing trends of stillbirth and infant death frequencies over time suggests that there may have been an administrative or legislative re-ordering of institutional care circa 1930.



d. *Institutions*

The almshouse, poorhouse, or work farm as it was variously known, had been an instrument of social policy in America since the late seventeenth century. Most colonial cities and many smaller towns supported an almshouse or farm by the mid to late-eighteenth century as a means of controlling the movements of the itinerant poor who increasingly were viewed by authorities as a danger to the social order (Katz 1996). Poor relief was also managed by the granting of small sums known as 'outdoor relief' to those temporarily out of work, and by auctioning off the poor into a form of indentured servitude. Early nineteenth century attitudes to poor relief were based on the twin ideas of reform as the possibility of rehabilitation and education, and the enforcement of discipline by which it was hoped the causes of pauperism, idleness and alcohol consumption, could be eliminated. The Hudson County poor farm was established in 1862 in Secaucus and in the following year an almshouse was constructed on adjacent land. The almshouse was built to hold 500 residents and in 1873 had a residential population of 427 (Winfield 1874:321).

The function of the almshouse changed over time and this change should be reflected in the demographic composition of the residents. Originally intended to house the 'working poor' for only short intervals between employment, by the late-nineteenth century almshouses had become de facto old age homes with residents often staying for long durations until death (Katz 1996:93). Because most almshouses suffered from insufficient budgets, training, and supervision, they increasingly became little more than flophouses, and by the end of the nineteenth century dread of the poorhouse had become so widespread that only those individuals too old or too infirm to move on were left. The steady increase in mean age at death is a clear indication of this transformation at the Hudson County almshouse. From a mean age at death of 35 years for both sexes in the 1880s, by the 1930s that figure had more than doubled to 74 years for women and 71 years for men.

The remoteness of Snake Hill from population centers made it an ideal location for the isolation from society of prisoners, the insane, and persons afflicted with infectious diseases. Although specific treatments of diseases were often non-existent, by the late-nineteenth century it was well understood that crowded urban districts fostered the spread of infectious disease due to poor sanitation and the closeness of human contact (Melosi 2000). The work of Louis Pasteur and others, beginning in the 1860s, spawned a growing awareness of the bacteriological transmission of disease, and this understanding led the medical community to believe that isolation was an effective means of treatment. Ironically, sequestering large numbers of patients with infectious diseases usually raised the risk of infection for patients as well as staff by increasing potential exposure risks (OTA 1993:29).

Two principal facilities to treat contagious disease were established at Snake Hill; the smallpox hospital in 1881 and the tuberculosis hospital circa 1910. A third, smaller facility known as the Contagious Disease Hospital began transferring deceased patients to the Hudson County Burial Grounds in 1899 and absorbed the small pox wards before 1910 as vaccination programs severely curtailed that disease. Smallpox deaths peaked in 1902 (N=56) and quickly subsided with none reported after 1913. A Department of Commerce report in 1913 stated "As a 'scourge,' this disease [smallpox] now belongs to ancient history" (Dept. of Commerce 1913:30). Tuberculosis deaths reached a high point in 1913 (N=30) and continued in decreasing numbers until the final case was recorded in 1942. Table 11-6 presents data relating to the interments from the three infectious disease facilities at Hudson County's Institutional Complex at Snake Hill.

TABLE 11-6

BURIAL FREQUENCIES AND MEAN AGE AT DEATH FROM
SNAKE HILL INFECTIOUS DISEASE FACILITIES

Facility	Female	(mean age at death)	Male	(mean age at death)	Total Burials
Contagious Disease Hospital	14	(unavailable)	22	(unavailable)	38
Smallpox Hospital	46	(15.2 years)	88	(28.4 years)	178
Tuberculosis Hospital	45	(30.3 years)	286	(41.2 years)	338
Totals	105		396		554

Note: Variance between male+female and totals is due to entries of undetermined gender.

The etiology of smallpox and tuberculosis indicates no specific biological susceptibility on the basis of gender (OTA 1993, CDC 2004). The greater frequency of male deaths, then, probably has social rather than purely epidemiological causes related to the overall preponderance of males arriving at the county institutions or due to behaviors specific to men (two-thirds of reported TB cases in the U.S. in 1991 were male). A graph of mean age at death shows significant variances by gender, with males 80 percent older than females among smallpox deaths and 35 percent older for tuberculosis deaths (see Table 11-6). Such a broad disparity in mean age at death suggests a few hypotheses; (1) females acquired infections at a younger age than males therefore dying earlier, or (2) working-aged men had a greater tendency to gather together in large groups (e.g., at job sites, saloons) increasing the likelihood of exposure to infection at an older age.

The significant disparity in mean age at death between smallpox and tuberculosis is likely the result of epidemiological factors. Smallpox is highly virulent with death usually occurring in the second week after the onset of the infection (Henderson 1999). Tuberculosis, on the other hand, has a long latency period often extending for several years. Individuals infected with tuberculosis as adolescents had a fifty-fifty chance of reaching adulthood regardless of the course of the disease.

F. BURIAL GROUND ADMINISTRATION

It was not the intent of this project to provide an historic reconstruction of the establishment and growth of the Hudson County Burial Grounds at Snake Hill, however, throughout Berger's fieldwork and research relevant data and information was uncovered or revealed that assisted in the overall understanding of the county's burial grounds at Snake Hill.

One of the most important research tools was the discovery of the Hudson County Burial Register that is actually comprised of three separate hand-written ledger books. Ledger 1 begins in December 1880 with Lot No. 1 and completely fills 139 pages ending in March 1908 with Lot No. 4285. Entries in this ledger are a continuous line-by-line entry system with one month following immediately after the preceding row entry on the same page. Ledger 2 begins on Page 1 with April 1908, Lot No. 4286 and continues through June 1941. Entries within this ledger are arranged differently than Ledger 1 in that each page is reserved for a specific month and year-one month per page. Ledger 2 ends with Lot No. 6214. The third and final ledger, Ledger 3, begins in July 1941 with Lot No. 6215 and continues through April 1962 with the last interment in Lot No. 6537. As such, it would appear on face value that the Hudson County Burial Ground once encompassed a total of 6,537 grave shafts. However, a detailed review of the line-by-line entries revealed that an apparent clerical error had occurred in May 1895. At this time, the entry after Lot No. 2099 is Lot No. 3000 resulting in an gap of 901 grave plot numbers. Therefore, Lot Nos. 2100 through 2999 never existed in the Burial Ground and the total number of grave shafts actually excavated would have been 5,636.

The existence of three separate ledgers together with historic maps depicting the location of three different areas labeled 'burial ground' at Snake Hill posed the question whether each ledger was associated with a different area. Based on Berger's fieldwork and research, there appears to be no correlation between the three ledgers and the three different burial areas. Remembering that each ledger was one portion of a chronological series –Ledger 1 spanning 1880-1908, Ledger 2 including 1908-1941, and Ledger 3 encompassing 1941-1962 – then each of the burial areas would have to correspond to the burial dates of a specific ledger. However, Berger's disinterment in the easternmost of the three burial areas, Potter's Field, revealed interments ranging in date from 1895 to at least 1949 and thereby encompassing all three of the burial ledgers. Another scenario for how the burial grounds functioned was the examination of interment patterning and use of the three Hudson County burial areas.

What is intriguing, however, is that only the burial ground that was the focus of this project, Potter's Field – the easternmost of the three burial areas, had a building or cottage. The existence of a caretakers cottage or cemetery office may bear witness to a place of destination. In other words, if undertakers/morticians were transporting deceased from around the County to this burial ground, the presence of a formal building may have been a landmark. Otherwise, the undertakers/morticians would have had to enter the Institutional Complex to visit the Administrative Building and release the deceased over to the County for final burial. Moreover, one can imagine it to have been difficult to identify and distinguish Potter's Field amongst the open meadow, wetlands, and institutional facilities in the shadows of Snake Hill.

Along these same lines, it is possible that the County may have attempted to improve the appearance of the Hudson County Burial Grounds or at least Potter's Field at one time. Archaeological evidence of redware/terra cotta flower pot sherds, brick posts likely associated with a fence or gate, and a dry laid stone wall suggests some aesthetic considerations and/or maintenance of the burial ground. In addition, the discovery of a former landscape survey and plan illustrating Lombardy Poplars to be installed along the boundaries of the rectangularly shaped burial ground south (behind) the cemetery office also supports this hypothesis.

The Hudson County Burial Ground was the final resting place for both patients of the County's Institutional Complex at Snake Hill and those who died unknown, unclaimed, or destitute within the streets, hospitals and the like of Hudson County's developing urban centers. Examination of the Hudson County Burial Register indicates that nearly 30 different undertakers/morticians representing at least eight different cities/towns within the County prepared and transported individuals for interment at the Hudson County Burial Grounds (Table 11-7).

TABLE 11-7

CHRONOLOGICAL LISTING OF UNDERTAKERS/MORTICIANS
REPRESENTED IN HUDSON COUNTY BURIAL REGISTERS

Undertakers/Morticians Listed in Burial Register	Affiliated City/Location	Dates Represented In Burial Register	Frequency of Entries in Burial Register
Speer	Jersey City	1882-1900	145
Boylan	Jersey City	1884, 1885	26
Garhwind W.H.		1885	1
L.F. Kleber	Jersey City	1885	1
A.J. Volk	Hoboken	1910, 1915, 1936	7
P.J. Condon	Harrison / Kearny	1910, 1934, 1937, 1939	3
F.E. Prior	Jersey City	1919	1
Necker	Union City	1921, 1930-1947	60
J.H. Hughes	Jersey City	1922	1
S. Sharpe	Union City	1929	1
J.E. White	Jersey City	1931	3
Hoffman	Hoboken	1932-1959	109
Scatuorchio	Hoboken/ Jersey City	1935-1962	260
A.L. Bancarti Jr.		1937	1
Joseph Delaney	Jersey City	1938	1
Rieman	Union City	1939-1961	26
Scheurle	West New York	1940-1941	2
Bonacarti	Union City	1941, 1943, 1944	5
Fay	Newark / Arlington	1941-1954	22
O'Brien	Bayonne	1942-1959	29
Darke		1944	1
Flay		1945-1946	3
Horgan		1947-1952	5
Failla	Hoboken	1952, 1953, 1955	4
DeMarco		1954	1
J.L. Purce		1954	1
O'Hara	Hoboken	1954	1
Shaw	Kearny	1954-1960	16
		Total	**736**

The earliest recorded undertaker associated with the Hudson County Burial Ground was Speer. At least two members of the Speer family, Abraham Speer and his son William Henry Speer were well known Jersey City undertakers in the middle to late nineteenth century. In 1857, Abraham Speer purchased the DeMott family burial ground on Vroom Street in Jersey City and converted it into a public cemetery. Speer sold "burial plots for $16 each" creating a "potter's field during the nineteenth century"

(Karnoutsos n.d). Abraham's son, William Henry Speer (b.1838, m.1862), also was a Jersey City undertaker for about forty years. In 1900 he was noted as the "…oldest and best known undertaker in East Jersey, and during his entire career has enjoyed the respect and confidence of all who know him." (Jersey City web site 2003).

Although informative, this listing of undertakers/morticians is clearly incomplete largely due to changes in administrative record keeping of the Burial Register and the 82 years of operation of the burial grounds. As much as some undertakers/morticians could be deciphered from the notations and secondary entries in the Burial Register, it is equally obvious that any individual that died outside the Institutional Complex at Snake Hill must have been prepared for interment by an undertaker/mortician before arriving at one of the Hudson County Burial Grounds. The actual contractual and administrative procedures, and financial reimbursements between the undertakers/morticians and the County is uncertain. However, it is unmistakable that the Hudson County Burial Ground at Snake Hill functioned as the County's "potter's field" or "pauper's cemetery" throughout its existence and operation (1880 thru 1962).

Though there is a standard set of information recorded within the Burial Register for each individual interred at the Hudson County Burial Ground over time, there also appears to be sporadic secondary number notations within the Burial Register. These numbers have no correlation to the final burial plot number and appear at times in random and nonconsecutive order. The first of these numbers, "No. 8" and No. 9" are associated with Undertaker Speer in December 1882, followed by "No. 82" in July 1884, and then "35, 38, 45, and 56" in April 1885. An apparent consecutive numbering series associated with Speer begins in August 1885 with the number "112" and continues through September 1901 ending the number "1000". Further review of the Burial Register by Berger indicates similar consecutive numerical sequences. Table 11-8 provides an overview of some of these secondary number notations with corresponding information on the location of death as recorded in the Burial Register as well as other information derived from additional notations made in the Burial Register. Review of these results strongly suggests a correlation between a specific undertaker/mortician and/or period of time within identified cities/towns. As such it is likely that each undertaker/mortician and/or the Hudson County Burial Ground administrative clerk kept a record of the number of individuals delivered to the burial ground. The archaeological excavations and analysis of coffin plates recovered from the Potter's Field grave shafts provides evidence that these numbers corresponded to the coffin number plates that were affixed to the coffin upon arrival at the burial ground. Archaeological evidence also indicates that each undertaker/mortician had a particular style or type of coffin number plates readily available for use within their funeral home. The distinctive coffin plate styles used by A.J. Volk, Thomas Hughes, and Patrick J. Gorman are noteworthy examples (see Chapter 8 coffin plates).

G. IDENTIFICATION OF INDIVIDUALS AND DESCRIPTIONS OF SELECTED BURIALS

1. Burial Identification Methodology

One of the greatest challenges confronting the Berger team during the project was attempting to identify the interred individuals with little accompanying data. Potter's Field had no physical markers that would assist in the search and documentary resources were fragmentary at best. Thus, a multi-faceted approach combining four main lines of evidence was employed in an attempt to recover the identity of as many individuals as possible while recording ancillary information such as cause of death, ethnicity, social status, and religious affiliation, to name a few. The four lines of evidence include: historical evidence (primary documents, secondary histories, burial records, death certificates), cartographic evidence (state, county, burial ground maps), artifact evidence (form, function, date of manufacture), and osteological

TABLE 11-8

CORRELATION BETWEEN SECONDARY NUMERICAL NOTATIONS, LOCATION OF DEATH, DATE RANGE, AND UNDERTAKERS/MORTICIANS

LOCATION OF DEATH (UNDERTAKER)	DATES FROM BURIAL REGISTER	NUMBERS AND NUMERICAL SERIES	ADDITIONAL NOTATIONS/COMMENTS
Jersey City (Speer)	August 1882		Name appears frequently
	December 1882	"No. 8" & "No. 9"	Name & Numbers
	July 1884	No. 82	
	April 1885	35, 38, 45, 56	
	July 1885	169	
	August 1885 – September 1901	112 - 1000	Consecutive numbers
	February 1887		Appearance of name stops but consecutive numbers continue
	January & October 1890		Name appears twice
	April 1900		Name appears for the last time
Jersey City	September 1901- September 1902	"1A" thru "93A"	Not consecutive- 45 numbers not listed
Jersey City	October 1902 – December 1915	"No 3" thru 655	
Jersey City	May 1903	"TH 46" & "TH 47"	Likely Undertaker Thomas Hughes
Jersey City	January 1916 – December 1918	1 - 145	Undertaker JJ McGuire
	April 1916 – December 1918	28 - 282	Undertaker PJ Gorman
	January 1919 – November 1924	656 - 723	Undertaker J Hughes Gaps & skipped months
	January 1919 – March 1921	13 - 220	
Hoboken / West Hoboken	November 1900 - June 1903	10- 91	Consecutive numbers
	July 1903 – December 1915	1- 1342	Consecutive numbers but large gaps
	January 1916	2575 - 2577, 2683	Undertaker J McLaughlin
	March 1916 - May 1917	12- 198	Undertaker J McLaughlin
	May 1917 - June 1920	5 - 363	
Bayonne	March 1919 – October 1920	2 - 12	

evidence (gender, age, cause of death). In most instances, several lines of evidence converged, providing definitive data on a particular burial.

The process for identifying burials evolved somewhat during the course of fieldwork. Initially, it was not anticipated that artifacts of analytical value would be recovered in significant quantities. However, it became apparent that a variety of artifacts were present that could aid immeasurably in the identification of the associated burials. Among these were the various types of name/number coffin plates present in some of the burials. These plates, when decipherable, could be compared with existing burial records to determine the identity of an individual. Within the burial records, a series of numbers were periodically written in the vicinity of the column containing the name of the deceased. Prior to the fieldwork, it was not known what the function of these numbers was. However, it became evident that these numbers were in fact related to the physical identification plates attached to some of the coffins. By cross-checking with osteological evidence and/or available death certificates their function was confirmed. In cases when an individual was identified, it indicated that de facto two, or in rare instances, three individuals were identified, since the names of shaft mates were readily available from the Hudson County Burial Register.

As the identity of multiple individuals became known and were plotted on Berger's burial ground map, temporal burial patterns began to emerge. This allowed for the identification of individuals based on the date of death, age and gender taken from the Burial Register juxtaposed against the osteological data recovered from the burial. On occasion, artifactual data, such as initials on a ring, or an ethnically-symbolic medal or pendant, were used to hone the identification. Other times, artifacts that were normally gender-specific, such as razors, earrings, military medals and clothing were used to narrow the field of potential identities through the process of elimination. By far, the most effective tool for identification was the osteological analysis of the burial remains.

2. Case Studies

The Potter's Field project allowed Berger the opportunity to meld documentary, artifactual, and osteological evidence to create a multi-dimensional profile of select members of the interred population. However, the pre-burial economic and social circumstances of the deceased along with the varied taphonomic conditions of the burial ground, often resulted in one or more of these components being compromised or totally unavailable for further study. Where these three elements were present, case studies were assembled to provide a greater understanding of the complexities of the interred and the overall heterogeneity of Potter's Field. The following case studies were chosen for analysis because they met at least two, if not three of the aforementioned criteria, namely: well-preserved skeletal remains, diagnostic artifacts, and documentary references.

a. Burial No. 15,539B

This burial was unique because of its unusual coffin, exceptional preservation and positioning of the body prior to interment. The coffin was octagonal with a viewing plate and a white-metal sheet lining. The presence of the metal lining resulted in excellent preservation of the skeletal remains. Interestingly, the interred was placed in the coffin face down - the only such treatment identified at Potter's Field. The reason for this is unclear, however the identity of this individual may help to explain the circumstances surrounding this unusual position. Based on the location of graves on Map No. 769 and analysis of surrounding graves, this burial was correlated with historic grave shaft 5027 and identified in the Burial Register only as an unknown male, who died on October 22, 1917 in Jersey City.

PLATE 11-1: Burial No. 15,539 B

b. Burial No. 793A

Burial 793A arguably produced one of the best combined osteological/artifactual assemblages recovered during the project. This burial contained the largest group of non-coffin-related artifacts (N=184) recovered from Potter's Field. An additional 23 artifacts were found from the mixed context of 793A/B, some of which likely originated in Burial No. 793A. Artifacts from Burial No. 793A included a large number of personal items that far exceeded those typically included on the remains for burial. Interestingly, the majority of these items were in some way related to the appearance or personal hygiene of the deceased. Among these were hair curler fragments (N=20), bottles (N=4), mirror fragments (N=2), a can of talcum powder, a cold-cream jar, a lipstick case, a hairbrush, a toothbrush, and numerous make-up containers (Plate 11-2). It is possible that these articles were kept in a small piece of luggage or toiletry case included in the grave. This is evidenced by a luggage-type zipper, a ferrous buckle similar to those found on suitcases, and a small leather frame with a plastic window commonly used as a luggage identification tag. The body had been dressed in an elegant navy blue dress with matching open-toed satin shoes (see Chapter 8, Plates 8-33 and 8-38). Elaborate white plastic buttons were affixed to the dress. Additional fabric which appeared to be lavender-colored satin with numerous pin holes likely was coffin lining that became dislodged after the coffin deteriorated. A dental bridge with a gold palate and anchors with porcelain teeth also was recovered. Two pencil fragments and a pencil case fragment indicate that the deceased possessed some degree of literacy.

PLATE 11-2: Array of Feminine Toiletries from Burial No. 793 A

The explanation for this remarkable array of personal items and the apparent obsession with physical appearance may lie in the unique attributes present on the skeletal remains. Osteological analysis indicated that this individual was a 44 year old female who suffered from cerebral palsy, rickets, and osteoarthritis. Cerebral palsy is a pathology affecting the ability to control movement that is caused by brain lesions resulting from a prenatal defect or birth injury. As is typical of most cerebral palsy victims, stiff muscles make movement difficult and the victims usually die from complications secondary to immobility. In addition, cerebral palsy patients usually have facial dystonia that results in frequently smiling and gazing at the caregiver. Cerebral palsy patients are generally sweet and loving, and develop dependent relationships with their caregivers. As such, it is likely that this middle-aged women was bedridden for a very lengthy period and her caregivers spent quality time with her by brushing and curling her hair and putting on various makeup to make her feel special. The recovery of her blue dress and open-toed shoes also suggests that one or more caregivers ensured that she was properly attired prior to be interment in Potter's Field.

c. Burial No. 11,591 A

This burial contained the remains of Rocher Menger, who died on March 9, 1905 in Jersey City. The identification of this burial was based largely on a complete number plate, which read "196 T.H.,". Based on Berger analysis of coffin plate numbers contained in the Hudson County Burial Register, this coffin plate number was determined to represent one of Thomas Hughes' coffin plates. This burial was also notable because of four complete bottles recovered from the grave. Two were pharmaceutical bottles from two local Jersey City druggists: Laird's Pharmacy and M.W. Sergeant Prescription Druggist. A third bottle was embossed "Omega Oil," which is a substance used to treat cardiovascular disease. Ironically, the fourth bottle was not medicinal, at least not in the technical sense. This bottle was a strap-shouldered whiskey flask with the embossment "Honest Measure Full ½ Pint" on its side.

The lower or bottom individual in the grave shaft containing Rocher Menger was also identified. Rosa Dumont's burial included a second coffin plate number "196 T.H.". Rosa Dumont was buried in grave number 4096 of Potter's Field along with Rocher Menger on March 9, 1905.

d. Burial No. 15,239 A

Only one individual recovered from Potter's Field displayed clear evidence of gunshot wounds. During excavation of Burial No. 15,239A, an impacted 0.32 caliber lead bullet was found in the vicinity of the skull. Once Burial No. 15,239A was exhumed and inspected, two distinct head wounds were apparent. Osteological analysis indicated that this young (20 years of age) adult male was shot twice in the head, one entrance wound was visible on the right parietal (side of the skull) and a second bullet entered near the base of the skull at the neck. The bullet from the second shot was recovered from inside the skull during analysis. The first shot was in all likelihood the fatal wound.

PLATE 11-3: Trajectory (Left to Right Photo) of Fatal Gunshot Wound, Burial No. 15,239 A

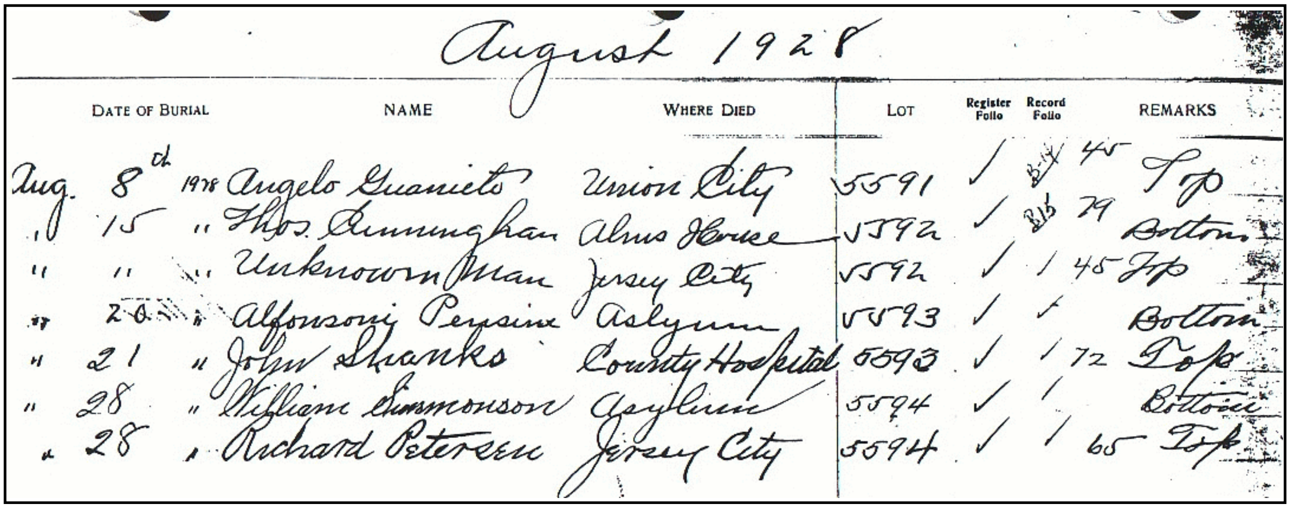
e. Burial No. 314 B

The case study of Burial No. 314B was unique in that it provided family members with the physical evidence to end a long and very-troubling saga of their lost relative. Diane Brule had wanted to find her grandmother ever since she was a small child, even though they had never met. It was believed that when her grandmother died, that she was buried within the Hudson County Burial Grounds in Secaucus, New Jersey as her grandmother's name, Alfonsina Pansini, was listed in the Burial Registers as being buried in the county burial ground (Plate 11-4). When Ms. Brule discovered that the New Jersey Turnpike Authority was tasked with the disinterment and reinterment individuals buried within Potter's Field, one of the county's burial grounds, she came forward and requested that an effort be made to identify her grandmother's remains amongst the 4,571 unmarked graves.

PLATE 11-4: Photograph of Alfonsina Pansini

Ms. Brule stated that her grandmother had come to the United States from Italy with her husband, and that her grandfather had worked as a longshoreman after immigrating. Ms. Brule remembered that her grandmother had died between 42 and 45 years of age and was five feet two inches (5'2") in height. She provided the Berger team with a photograph of her grandmother. Ms. Brule shared that Alfonsina Pansini had died in the Hudson County Mental Hospital in 1928 after her husband had her committed. He also subsequently sent their children to an orphanage. Ms. Brule was distressed that her grandmother had been abandoned both in life and then again in death – having been buried in an unmarked grave within the Hudson County Burial Ground. Ms. Brule had spent her life hoping that she could help right this wrong.

As such, Berger was tasked with attempting to find and identify Alfonsina Pansini from amongst the burial population of 4,571 individuals interred within unmarked graves in this portion of the county's burial ground. The Berger team decided that a review of existing historic records and maps might be the best first approach in attempting to find Mrs. Pansini's remains. The Burial Register indicated that Alfonsina Pansini died on August 20, 1928 at the "Asylum" and was buried in the bottom burial position of Lot (or shaft number) 5593 (Figure 11-1). The historic records identified the two individuals interred in this shaft: Alfonsina Pansini occupied the bottom position in the shaft and her shaft mate was listed as John Shanks who died at 72 years of age. Mr. Shanks died at the County Hospital. The historic records did not give Mrs. Pansini's age at death, but Ms. Brule, using historic family letters and documents, gave Mrs. Pansini's age at death as being between 42 and 45 years.



August 1928

Date of Burial	Name	Where Died	Lot	Register Folio	Record Folio	Remarks
Aug. 8th 1928	Angelo Guaniets	Union City	5591	/	B-4 45	Top
" 15 "	Thos. Cunningham	Alms House	5592	/	B-15 79	Bottom
" " "	Unknown Man	Jersey City	5592	/	/ 45	Top
" 20 "	Alfonsoni Persine	Aslyum	5593	/	/	Bottom
" 21 "	John Shanks	County Hospital	5593	/	/ 72	Top
" 28 "	William Simmonson	Asylum	5594	/	/	Bottom
" 28 "	Richard Petersen	Jersey City	5594	/	/ 65	Top

FIGURE 11-1: Hudson County Burial Register Listing the Death and Burial Lot of Alfonsina Pansini and John Shanks (Note misspelling in Register)

Having found that Mrs. Pansini was supposedly interred within Lot (burial shaft) 5593, the next logical step in attempting to recover her remains was to determine if the available historic maps of Potter's Field (note that not all the historic maps of the burial ground remained and those that did – did not always list all of the individuals or Lots which had been created within that specific portion of the burial ground) indicated where she might been interred. The tabulation of 'grave boards' at the top of Map No. 1188 provided the coordinates to Lot 5593 and indicated that the lot was located in Section 3 of Potter's Field. Artifact analysis and coffin plate number correlations enabled the Berger team to be able to date Section 3 of Potter's Field to the late 1920's. Thus, the dates of this section of the burial ground in which Lot 5593 was plotted, matched the date of Alfonsina Pansini's death – the year 1928.

Having made this discovery, it was next necessary to try to correlate this historic map location of the lot with the burial ground map created by Berger during the disinterment of the unmarked graves. As could be expected, there were discrepancies between the historic maps and the newly created Berger burial location maps. Generally, these differences probably exist due to the lack of a common central datum which could potentially tie the maps together.

However, to overcome these discrepancies, the historic map which illustrated the possible location of Mrs. Pansini was transferred onto a transparency and then placed over the Berger burial ground map in an effort to match the burial shaft locations and alignments. Further, remembering that Mrs. Pansini was placed in a burial lot with another individual, it was important to search for burial shafts within this general location which contained two interments, one female and one male.

Only four burial shafts discovered by the Berger archaeological team which were located in the general vicinity of burial lot number 5593 matched the specific pattern of a male and female buried in the same grave shaft. However, three of these graves were eliminated from consideration as historic grave number 5593 because these three graves either did not contain a male above a female, were oriented significantly differently than historic grave 5593 was, and/or the age at death of the persons buried in these graves was not consistent with the age at death of the male burial in historic grave 5593 reported in the burial ledgers or the age at death of Mrs. Pansini. The remaining double burial – Berger Burial No. 314 – did, however, match. Indeed, historic burial lot 5593 best aligns with Berger's Burial No. 314.

Once this locational information had been correlated and the team believed that Burial No. 314 was the most likely to contain the remains of Mrs. Pansini, then detailed and careful osteological and forensic analyses were needed to determine if the skeletal remains at the bottom of Burial No. 314 were indeed those of Mrs. Pansini. Thus, analyses was undertaken on the remains of both of the individuals buried within Burial No. 314 to determine if the osteological data so derived correlated with the historic records and characteristics attributed to Mrs. Pansini.

It should be noted that there were not many women interred within the Hudson County Burial Grounds. In fact, women represented only approximately one-quarter (or roughly 25 percent) of the entire burial population. The average height of the women in this burial ground was five feet three inches (5'3") and thus, Mrs. Pansini who was reported to be 5'2" in height, would not stand out in this burial population by her height. The average age at death for females within this burial population was 42.5 years of age. Mrs. Pansini would also not stand out due to her age, as she was reported to be between 42 and 45 years old at time of death.

Both of the individuals interred within Burial No. 314 were in a poor state of preservation. Burial No. 314A (the skeletal remains recovered from the upper portion of the burial shaft) was determined to be a male based on the large mastoid process, zygomatic arch extension, pronounced nuchal crest, and a strong expression of the mental eminence. This individual was determined to be over 50 years of age based on cranial suture closure and an edentulous mandible with complete alveolar resorption. Thus, the osteological analysis of Burial No. 314A correlated very closely with the age and gender of John Shanks who was interred in the top burial position above Alfonsina Pansini in historic Burial Lot 5593.

Burial No. 314B was determined to be a female based on the presence of the very small mastoid process, the absence of a nuchal crest, and the morphological characteristics of the sciatic notch. This individual was determined to be approximately 40 years of age based on the auricular surface located on the left innominate. Additionally, the cranial suture closure indicated that this individual was at least 38+ years old at the time of death. Alfonsina Pansini was reported to be between 42 and 45 years of age. Measurements of the skeletal remains of Burial No. 314B indicated this woman was approximately five feet one inch (5'1") in height, based on the measurement of her left fibula. Thus, the calculated stature of Burial No. 314B closely matches the reported height of 5'2" for Mrs. Alfonsina Pansini.

Based on the above analyses, Burial No. 314B matched the age, gender, and stature of Alfonsina Pansini. In addition, Burial No. 314A matched the age and gender of her recorded shaft mate John Shanks. Thus, it was concluded that the remains of Burial No. 314B were indeed those of Alfonsina Pansini.

The Superior Court of Hudson County concurred with Berger's determination and identification of the remains as those belonging to Mrs. Alfonsina Pansini, and thereby awarded release of the skeletal remains to Ms. Diane Brule and her family. Indeed, the judge determined that the osteological and forensic evidence compiled by the Berger team was so compelling that the remains were turned over without requiring DNA testing.

f. Burial No. 935 B

One of the most poignant moments of the Potter's Field disinterment was the identification of Burial No. 935B for it brought closure to a 25-year long search for a father and grandfather.

Near the very beginning of the project, Mr. Gennaro Andriani, and his son Patrick, came forward and indicated that Leonardo Andriani, Gennaro's father and Patrick's grandfather, was buried in the Hudson County Burial Ground. They requested that an effort be made to identify the remains of Leonardo Andriani and return these remains to the family for reburial. As such, Turnpike Authority directed the Berger team to make an effort to discover and recover the remains of Leonardo Andriani.

The Andriani family provided both a photograph of Lenoardo Andriani (Plate 11-5) and a copy of Leonardo's death certificate (Plate 11-6) to the Berger team to aid in the identification of his remains. Leonardo's death certificate provided very useful information including (1) that he was born in Italy in 1894, (2) that his occupation was a longshoreman, (3) that he died at the Hudson County Hospital for Mental Diseases, (4) that he died on Christmas Eve – December 24, 1948 – at 54 years of age from chronic myocarditis (which would not be observable in the skeletal remains), and (5) that he was buried on New Years Eve December 31, 1948 at the Hudson County Burial Grounds, Laurel Hill, Secaucus, New Jersey. Additionally, Leonardo's death certificate stated that an autopsy had been performed after his death.

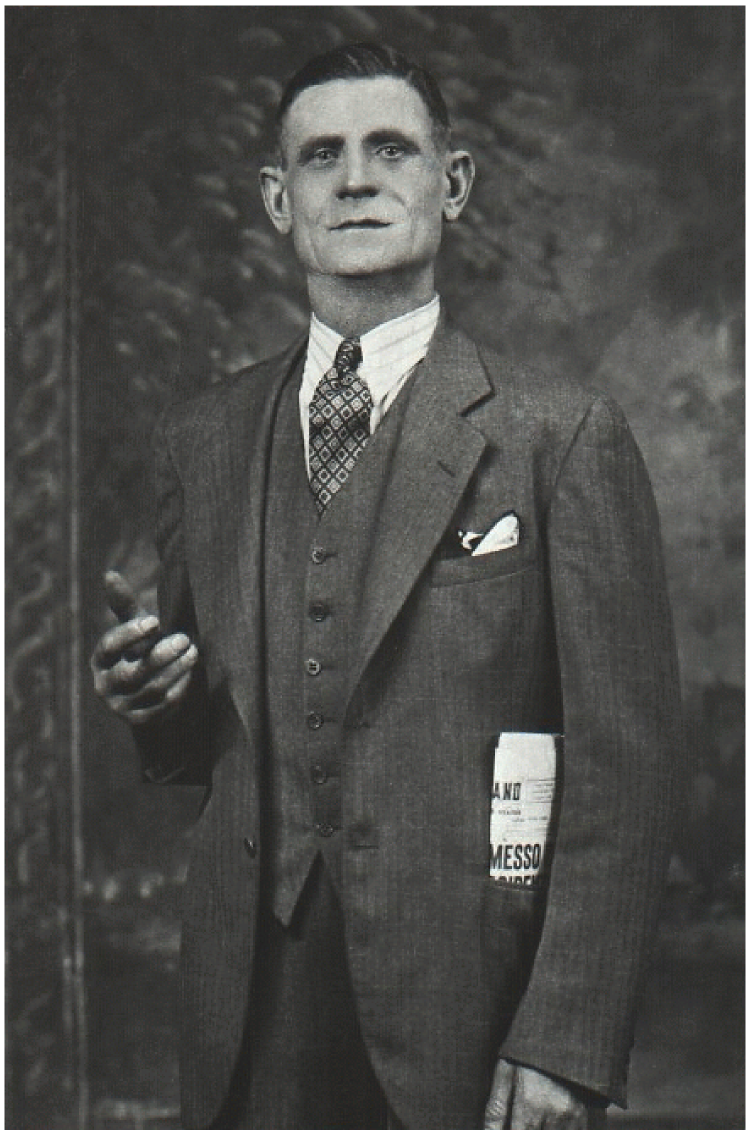
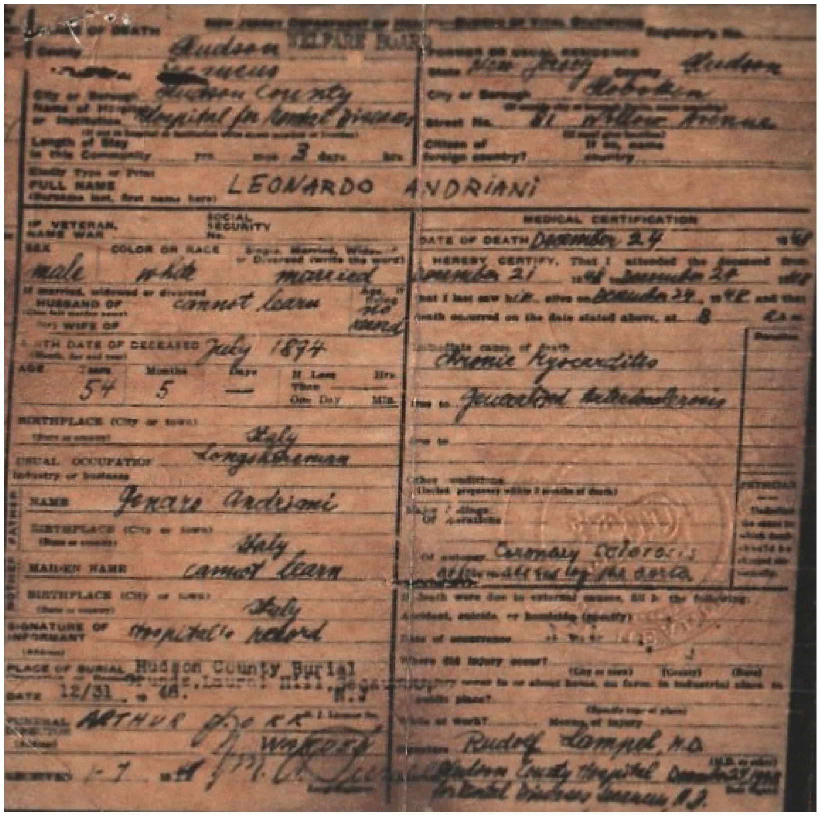


PLATE 11-5: Historic Photograph of Leonardo Andriani



Hudson

Secaucus

Hudson County

Hospital for Mental Diseases

3

New Jersey

Hudson

Hoboken

81 Willow Avenue

LEONARDO ANDRIANI

male

white

married

July 1894

54 5

Italy

Longshoreman

Jenaro Andriani

Italy

cannot learn

Italy

Hospital's record

Hudson County Burial

12/31 48

Rudolf Lampel, M.D.

PLATE 11-6: Photocopy of Leonardo Andriani's Death Certificate

Patrick Andriani also provided additional personal information that he and his father remembered about Leonardo Andriani, which they believed might help the Berger team to identify Leonardo. Leonardo was reported to be 6'3" or 6'4" in height, of Italian ancestry, had a gold upper tooth, walked with a limp, died at age 54, and they speculate that Leonardo was buried in Section 12 of Potter's Field. He was said to have blond hair, blue eyes, and large hands – however, these traits are considered soft tissue characteristics and would be unlikely to be preserve in the skeletal remains.

Typically, burials at Potter's Field were interred in the ground in a similar manner. Generally, burials were double or multiple interments. That is, multiple bodies were commonly stacked vertically on top of each other or side-by-side within a single grave shaft. Occasionally, a single individual was the sole occupant in the burial shaft, but more often the number of individuals per burial shaft ranged from two to three; indeed, sometimes the number of individuals per burial shaft ranged from four to seven.

The Hudson County Burial Registers indicate that Leonardo Andriani died at the Hudson County mental disease hospital on December 24, 1948 and was buried on December 31, 1948. He was 54 years old at the time of his death. Leonardo Andriani was interred as a double burial, and occupied the lower (bottom) burial position of Grave Lot 6408. These records also indicate that his shaft mate was a Daniel Smith. The historic death certificates for both Andriani and Smith are curated at the Bureau of Vital Statistics in Trenton, New Jersey. The Hudson County Burial Registers do not provide any additional information as to the age at death or cause of death for Mr. Smith, but they do provide some useful information regarding Mr. Smith.

The historic records indicate that Daniel Smith died at the same Hudson County Mental Disease Hospital as Leonardo Andriani on January 1, 1949. Daniel Smith's death certificate indicates that he was born in England circa 1870, that his occupation was as a porter, that he died at the Hudson County Hospital for Mental Disease after residing at the hospital for a little over two years, that he died on January 1, 1949 at about 79 years of age, and that he was buried on January 4, 1949 at the Hudson County Burial Grounds (Potter's Field), Laurel Hill, Secaucus, New Jersey.

Several historic maps of various sections of the Potter's Field had been obtained by the Berger team. However, the Berger team had not been able to locate historic maps of the entire burial ground; thus, several large sections of the burial ground are missing historic map references. Leonardo Andriani's Burial Lot (grave shaft) 6408 did not appear on any of historic maps in Berger's possession. Thus, there was no available historic data to indicate where within Potter's Field Leonardo Andriani may have been buried.

The Burial Register have secondary journal entries that indicate if and when certain individuals were disinterred from their original burial lot and re-interred elsewhere. During the excavations at Potter's Field, the areas that were historically documented as disinterment areas were identified as disturbed and empty burial shafts. Leonardo Andriani's journal entry did not indicate that he had been disinterred, although a letter dated January 11, 1980 from the County Prosecutor's Office, led to speculation that perhaps Leonardo Andriani had been previously disinterred and re-located to this second cemetery. Additional research and field excavations demonstrated, however, that this was untrue – Leonardo had never been previously disinterred from Potter's Field.

Thus, Grave Lot 6408 at Potter's Field would contain the remains of both Andriani and Daniel Smith. Unfortunately, as was common at Potter's Field, most burial shafts did not receive an actual marker, and those that did, had by this time lost theirs. Indeed, only two grave lot markers were discovered in situ. Thus, Grave Lot Number 6408 was never located, leaving the historic Hudson County Burial Register as the only evidence that Leonardo Andriani was interred at Potter's Field.

As the above discussion indicates, historic records, historic maps, and grave lot markers were not going to provide the primary means of discovering Leonardo Andriani's remains. Osteological and forensic analyses would have to be the primary methods by which the identification of Andriani's and Smith's skeletons were going to be accomplished.

Specifically, the information provided in the historic records, especially the death certificate, along with the information provided by Patrick Andriani regarding his grandfather, were going to provide the baseline information by which osteological analysis might be able to recognize and confirm the identity of Leonardo Andriani. Thus, the identification of a gold tooth, pathologies that may have resulted in Andriani walking with a limp, facial/skull characteristics, height, evidence of an autopsy being conducted, and age at death – where going to become critical clues in the search for, and identification of, Leonardo Andriani. Each of the potential candidates had to meet the following qualifications to be considered a potential match for Leonardo Andriani:

(1) buried at the bottom of the shaft with a second individual placed directly above him
(2) identified as being between 48 and 58 years of age (a 10 year range was chosen because environmental and health conditions may skew the skeletal age of an individual as compared to the chronological age of a person)
(3) determined to be an adult male
(4) the shaft mate must be male
(5) have a calculated stature of 6'1" or greater based on the length of the long bones.

The absence of a gold tooth would not necessarily eliminate a candidate unless all of the teeth could be accounted for, analyzed, and determined that the individual never had a gold tooth. However, the presence of a gold tooth would be a positive indicator. Concurrently, the presence of a pathological trait such as a broken leg or foot, infected leg or foot, and/or arthritis of the leg or foot would be a good indication that the candidate walked with a limp. However, Andriani may have had a soft tissue injury such as a pulled muscle or tendon which made him walk with a limp. This type of soft tissue injury would not leave a signature on the bone and thus, a particular skeleton could not necessarily be eliminated as a candidate for lack of osteological evidence for a limp.

To begin the search for Andriani employing osteological and forensic evidence, it was decided that height might be the first, best criteria for delineating a small sample of recovered individuals/skeletons as possible candidates. Thus, a site-wide database search was conducted, looking for all individuals measuring 6'1" or taller in calculated height based on long bone measurements. Fifty-six individuals were identified as possible Andriani candidates based on a calculated height of 6' 1" or taller. These fifty-six burials were specially cleaned and prepared for further, detailed osteological and forensic analyses.

Again, the historic records indicated that Leonardo Andriani occupied the lower (or bottom) burial position in Grave Lot 6408. Of the 56 tall people, 33 potential candidates were buried in the upper (or top) shaft position and thus, were eliminated as being a candidate for the remains of Andriani since those particular remains were recovered in the wrong vertical shaft position (Table 11-9). The remaining 23 candidates were analyzed as to their sex. Two individuals were discovered to be female and therefore were eliminated from the list of possible candidates. The remaining 21 candidates were analyzed to confirm the age of the individuals at death. Eleven people were eliminated as not meeting the age requirement of 48 to 58 years of age. Next, the second individual interred in these double burials was analyzed as to sex and age, looking of a match to the shaft mate of Leonardo Andriani, Daniel Smith. Of the remaining ten potential candidates, five of the shaft mates in the upper (or top) position were female and thus, eliminated as potential candidates. Five double burial deposits remained. One of these deposits was interred in an area of the cemetery for which we have historic maps and could identify this man by name. He was not Leonardo Andriani and thus, eliminated.

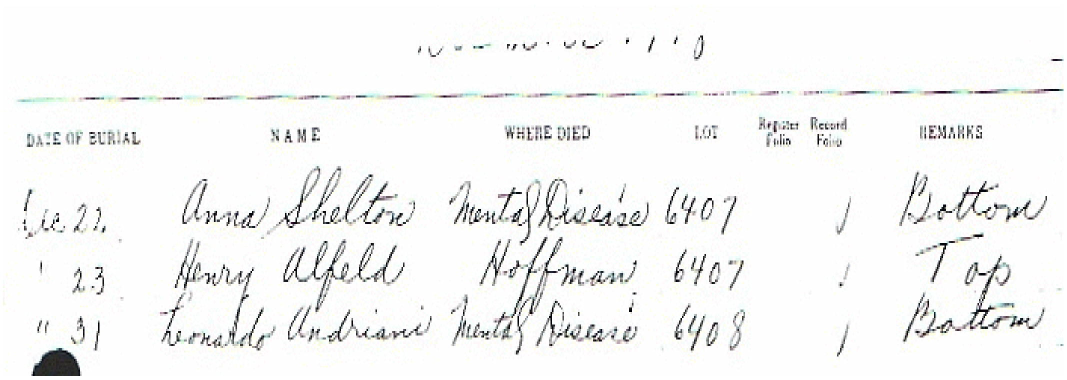
TABLE 11-9

ELIMINATION CRITERIA USED IN SEARCH FOR LEONARDO ANDRIANI

CRITERIA	NUMBER OF INDIVIDUALS	REMAINING POSSIBILITIES
Individuals 6'1" or taller	n=56	56
Individuals 6'1"or taller in top burial position	n=33	23
Individuals 6'1" or taller in bottom burial position who are female	n=2	21
Individuals 6'1" or taller in bottom burial position who are male but the wrong age	n=11	10
Individuals 6'1" or taller in the bottom burial position who are male, the correct age but the shaft mate is female	n=5	5
Individuals 6'1" or taller in the bottom burial position who are male, the correct age, the shaft mate is male, but the name of this individual is known and is not Leonardo Andriani	n=1	4
Individuals who were 6'1" or taller but were too deteriorated or were too co-mingled to obtain further information	n=2	2

Four double burial deposits remained. Two of these individuals are the right height but are too deteriorated to obtain any further information and were eliminated due to the lack of information potential. The results of this rough sort left only two individuals within two double burial deposits that were preserved well enough to analyze plus met the height and age criteria to be considered as possible candidates for Leonardo Andriani's skeletal remains.

Berger Burial No. 935B appeared to be the best candidate for the remains of Leonardo Andriani based on a number of osteological traits. The preservation of these particular human remains was considered good and the skeletal completeness was estimated at greater than 75 percent. This individual was a male as indicated by a narrow sciatic notch, large nuchal crest, large mastoid, gonial angle of 113 degrees. Further, this individual was in his early 50's, based on the morphology of the auricular surface on the pelvis. He was in the lower or bottom burial position and his shaft mate is a male (Plate 11-7).



DATE OF BURIAL	NAME	WHERE DIED	LOT	Register Folio	Record Folio	REMARKS
Dec. 22.	Anna Shelton	Mental Disease	6407		/	Bottom
" 23	Henry Alfeld	Hoffman	6407		/	Top
" 31	Leonardo Andriani	Mental Disease	6408		/	Bottom

PLATE 11-7: Portion of Burial Register Indicating Andriani's Location in Burial Lot 6403 in the Bottom Position

The individual contained within Burial No. 935B was approximately 6'1" in height, plus or minus 1.5" based on femur length (skeletally derived stature estimates are slightly shorter than an individuals height during life). This individual's upper right second incisor was capped in gold that would have been visible to others (Plate 11-8). This individual had arthritis in his hip and foot that may have caused a limp in his gait as identified for Leonardo Andriani (Plate 11-9).

Dental analysis, conducted as a part of the general osteological analysis program, discovered a Carabelli's Cusp from Burial No. 935B. Carabelli's Cusp is a dental trait indicative of European descent consistent with Andriani's Italian heritage. The mandible of the man contained within Burial No. 935B had a strong square jaw line (Plate 11-10). This feature correlates with a photograph of Leonardo Andriani that showed that he had a strong square jaw line.

In summary, Burial No. 935B had a number of osteological traits that strongly suggested that this individual was Leonardo Andriani. Further, Burial No. 935B is located in Section 11 of Potter's Field, near the border with Section 12, where records indicate Andriani should be buried. The burial ground grew through time and these various sections roughly correlate with different decades during which individuals were interred in Potter's Field. It has been determined through the analysis of coffin number plates, artifact remains, and osteological data that Section 11 and Section 12 of Potter's Field post-date 1940. That time frame correlates with the death of both Leonardo Andriani (1948) and Daniel Smith (1949).

PLATE 11-8: Photograph of a gold-capped maxillary second right incisor from Burial No. 935B

PLATE 11-9: Arthritic Lipping on Femur Head, Burial No. 935 B

PLATE 11-10: Distinctive Square Mandible of the Male Individual Recovered from Burial No. 935B

Burial No. 935A was placed directly above Burial No. 935B. The osteological remains were in a good state of preservation and a detailed analysis of these remains was undertaken to determine if these bones correlate to the remains of Andriani's shaft mate. The historic burial records indicate that Daniel Smith was buried directly above Leonardo Andriani , and this is the case for the remains positioned above Burial No. 935B.

The skeletal remains of Burial No. 935A represent the remains of a male. Diagnostic age determinates, the pubic symphysis and auricular surface, did not preserve and thus, secondary age determinates were utilized. Cranial suture closure indicated that this man was 51.5 years of age, plus or minus 12.6 years.

Observations on a fragment of the auricular surface revealed strong apical changes and dense bone suggesting that this was an older individual of 50+years of age. The cusps on the two lower second molars were worn smooth and polished suggesting an age of 45+ years. No upper teeth were preserved to compare tooth wear. Tooth wear is dependent on the upper and lower teeth occluding and wearing against each other. Numerous factors such as overbites, malocclusion, preferential occlusion due to dental disease, and so forth affect the rate of tooth wear.

The individual contained within Burial No. 935A suffered from severe osteoarthritis of both elbows (Plate 11-11), and also suffered from osteoarthritis of the lower back. These pathologies reflect the expected occupational stress markers of a person who lifted heavy objects, repetitively. Daniel Smith was a porter and lifted heavy luggage every day. Finally, the individual contained within Burial No. 935A was interred with a 1927 Mercury dime that falls within the timeframe of Smith's lifespan.

PLATE 11-11: Arthritic Elbows Discovered on the Individual from Burial No. 935A

Thus, in summary, Burial No. 935A correlates with the information associated with Daniel Smith. This individual's age, sex, burial position, occupational stress markers, date of the burial section in which he is interred, and the date of the associated artifacts all match Smith's historic profile. His osteological age is somewhat younger than Daniel Smith's reported chronological age but it is within the range of standard acceptable variability. Osteological age reflects individual health and environmental conditions and thus, can vary significantly (both older and younger) from chronological age.

It was noted that there were a number of correlations between the information in the historic record for Leonardo Andriani and Daniel Smith and the osteological, artifact, and locational data derived from the analyses of Burials Nos. 935A and 935B.

Burial No. 830B was the only other potential Andriani candidate in the entire burial population. This individual was a male approximately 50 years of age based on the morphology of the auricular surface on the pelvis. He was 6'0" tall, plus or minus 1.5" based on femur length (skeletally derived height estimates are usually slightly shorter than an individual's actual height during life). His stature is a little short but is within range. He is in the bottom burial position and his shaft mate is a male. No gold tooth was recovered, however, all of the teeth could not be accounted for, and thus the gold tooth could have been one of those which had fallen out. The pelvis was partially fused to the sacrum that may have caused this individual to have an uneven gait or limp.

However, this individual was buried within Section 8 of Potter's Field. Leonardo Andriani's Grave Lot 6408 was not depicted on the surviving historic Section 8 burial ground map. However, Berger's burial excavations identified more graves than were depicted on the Section 8 map. Thus, there are a number of burials within this section of the burial ground that remain unidentified and therefore, Burial No. 830B cannot be eliminated as being Andriani by this evidence.

However, Section 8 of Potter's Field dates from about 1936 to 1941. The last known date that individuals were interred in Section 8 was seven years prior to Leonardo Andriani's death. Burial No. 830A was analyzed to determine if it matched the known profile of Leonardo Andriani's shaft mate Daniel Smith. Burial No. 830A was determined to be a male, 48 to 50 years of age, which was inconsistent with Daniel Smith's age of 79 years. Additional osteological evidence as to occupational stress characteristic of Smith's work as a porter was also missing/absent. Thus, Burial No. 830B was eliminated as a candidate for Andriani.

In order to conclusively determine genetic relationships and/or family lines relating the skeletal remains of Burial No. 935B to Andriani, DNA testing was recommended and the following information was obtained from Dr. Deb Komar, Office of Medical Investigator, Albuquerque, New Mexico.

Only specialized laboratories have the ability to run DNA tests on skeletal remains. There are four such laboratories in the United States. They are located at (1) the University of New Mexico, (2) Arizona State University, (3) Michigan State University, and (4) Wayne State University. All of these laboratories are associated with their Department's of Anthropology.

There are two basic types of DNA testing; nuclear and mitochondrial. Nuclear DNA testing can only be performed with any accuracy on (1) individuals who died less than 30 years ago, and (2) bone that has never been in contact with any type of soil. Leonardo Andriani died 55 years ago and his bones were in direct contact with soil. Thus, Nuclear DNA testing on the Andriani skeletal remains is/was not an option.

The second type of DNA testing is mitochondrial DNA. This version of typing is also known as "Ancient DNA Testing" since it can be applied to the skeletal material of an individual that has been deceased for over 30 years. Further, bone contact with the soil does not in itself negate the results of this type of DNA testing. One of the following criteria must be met to initiate mitochondrial DNA testing on skeletal remains:

> (1) there must be two uncompromised teeth for testing samples; by 'uncompromised" it is meant that the teeth may not be cracked, chipped, or have caries, or
> (2) there must be intact and uncompromised metacarpal (hand) or metatarsal (feet) bones for sampling, or
> (3) there must be an uncompromised section of the femur (thigh bome) for sampling and it can not have dirt in the marrow cavity.

Burial No. 935B has the skeletal elements listed above in good condition thus, would qualify for mitochondrial DNA testing using these criteria. However, mitochondrial DNA testing also requires a comparative DNA sample derived from a maternal relative.

Thus, in the case of Leonardo Andriani, a comparative DNA sample must be obtained from Andriani's sister or her descendents (to follow the maternal line) and allow DNA testing and identification to occur.

Leonardo's descendant children and grandchildren would not be suitable comparative DNA donors. Therefore, in order to match the DNA derived from skeletal remains of Burial No. 935B with a qualified potential living descendent the following material is required, (1) blood spot or (2) cheek swab.

Patrick Andriani stated that Leonardo did have a sister and that she had two children. However, Leonardo's sister eloped many years ago in Italy, changed her name, and the families have lost contact over the past several decades. Patrick Andriani spent quite a bit of time and effort in trying to locate these family members in Italy, but to no avail. Thus, mitochondrial DNA testing is not an option in this case. Therefore, no form of DNA testing on Burial No. 935B was possible.

However, DNA evidence was not needed. The scientists from Berger had gathered sufficient evidence through osteological analysis to argue strongly that Burial No. 935B was the skeletal remains of Leonardo Andriani. Indeed, based upon the multiple lines of evidence presented above, it was determined by the Superior Court of Hudson County that Burial No. 935B did represent the remains of Leonardo Andriani and thus, the remains were turned over to the Andriani family for reburial.

H. SUMMARY DISCUSSION

Over the nine months of research, archaeological exploration, exhumation, documentation, and analysis, the Berger team disinterred 4,571 sets of human remains from Potter's Field in Secaucus, New Jersey. This represents about 46 percent of all individuals listed in the Hudson County Burial Registers (N=9,781) who were buried in one of three Hudson County Burials Grounds at Snake Hill (Laurel Hill).

The earliest identified individual disinterred by Berger was Burial No. 11,377A or historic burial plot 2082 of Charles Greenwald who was buried on March 28, 1895 and who died in Jersey City. The identification was based on the presence and recovery of the coffin plate number (585) correlated to the Burial Register. The latest identified individual disinterred by Berger was Daniel Smith (shaft mate of Leonardo Andriani) who was buried on January 4, 1949 and died while at the Mental Disease Hospital at Snake Hill. Identification was based on intensive osteological analysis and comparison to death certificate and grave shaft mate (Leonardo).

As a result of detailed research and analysis, The Berger team was able positively identify (i.e, name) 825 individuals out the 4,571 disinterred sets of remains. At the conclusion of the project, a total of 1,844 males and 674 females along with 2,056 sets of remains that were indeterminate with regard to gender were disinterred from Potter's Field. In addition, Berger recovered 17 sets of remains representing fetuses and 31 sets of remains for children under 3 years of age. Moreover, according to an examination of the Burial Register, there are 67 individuals identified as "colored" and the Berger team disinterred four confirmed Afro-American individuals from Potter's Field.

Although there have been larger private burial ground disinterments, such as the joint Laurel Hill/Calvary cemetery in San Francisco in the late 1930s/early 1940s, which saw the removal of over 90,000 bodies and the Lambert Airport project in St. Louis, the Secaucus Potter's Field disinterment project is believed to be the largest disinterment ever undertaken under a single contract in the United States and likely the largest disinterment of a potter's field.

CHAPTER 12. BIBLIOGRAPHY AND REFERENCES CITED

Alexander, L.T.
1983 Clay Tobacco Smoking Pipes from the Caleb Pusey House. In *The Archaeology of the Clay Tobacco Pipe VIII*, America, edited by Peter Davey, pp. 195-234. BAR International Series 175. Oxford, England.

Anderson, David G., John E. Cornelison, David Bean, and Paul D. Welch
2004 Illuminating the Past: Remote Sensing at Shiloh National Military Park. Accessed online February 25, 2004, at http://www.cr.nps.gov/seac/shiloh/shiloh-index.html.

Atkinson, D.R.
1965 Makers' Marks on Clay Tobacco Pipes Found in London, Part Two. *Archaeological News Letter* 7(11):249-256.

Atkinson, D.R., and Adrian Oswald
1969 *London Clay Tobacco Pipes*. Museum of London, England.

Aufderheide, Arthur C., and Conrado Rodriquez-Martin
1998 *The Cambridge Encyclopedia of Human Paleopathology*. Cambridge University Press, Cambridge, England.

Bacot, R.J., and L.W. Tost
1866 Map Showing the Location of County Road from Tonnele Ave to Poorhouse Farm, No. 541. August 9.

Bass, William M
1987 *Human Osteology: A Laboratory and Field Manual*. Missouri Archaeological Society, Columbia.

Bedino, James H.
2001 *Formaldehyde Embalming Sprays: A Modern Myth.* Accessed online at http://www.champion-newera.com/encyclo.html.

Bell, Edward L.
1990 The Historical Archaeology of Mortuary Behavior: Coffin Hardware from Uxbridge, Massachusetts. *Historical Archaeology* 24(3):54-78.

Berger (see The Louis Berger Group, Inc.)

Bloomingdale Brothers
1886 *Bloomingdale's Illustrated 1886 Catalog.* Republished by Dover Publications, Inc. (1988), New York, with Henry Ford Museum & Greenfield Village, Dearborn, Michigan (p. 134).

Boyd, W. Andrew
1890 *Gopsill's Jersey City, Hoboken, West Hoboken, Union Hill, and Weehawken Directory 1890-1891.* W. Andrew Boyd, Washington, D.C. On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

1899 *Boyd's Jersey City and Hoboken Directory 1900*. W. Andrew Boyd. On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

Boyd, William H.
1880 *Gopsill's Jersey City and Hoboken Directory 1881*. William H. Boyd, Washington, D.C. On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

Brothwell, Don R.
1981 *Digging Up Bones*. Cornell University Press, Ithaca, New York.

Brunner, Lillian Sholtis, and Doris Smith Suddarth
1974 *The Lippincott Manual of Nursing Practice.* J.B. Lippincott Company, Phliadelphia.

Bryant III, D., and C. Epps
1991 Proximal Femoral Focal Deficiency: Evaluation and Management. *Orthopedic* 14:775-783.

Buikstra, J.E.
1976 The Caribou Eskimo: General and specific disease. *American Journal of Physical Anthropology* 45: 351-68.

Buikstra, J.E., and M. Swegle
1989 Bone Modification Due to Burning: Experimental Evidence. In *Bone Modification*, edited by R. Bonnichsen and M. Sorg, pp. 247-258. Center for the Study of the First Americans, Orono, Maine.

Buikstra, Jane E., and Douglas H. Ubelaker
1994 *Standards for Data Collection from Human Skeletal Remains*. Arkansas Archaeological Survey Research Series No. 44, Fayetteville.

Burns, Karen Ramey
1999 *Forensic Anthropology Training Manual*. Prentice Hall, New Jersey.

Busch, Jane
1987 Second Time Around: A Look at Bottle Reuse. *Historical Archaeology* 21(1):67-80.

Business Directory of Bayonne
c. 1914 *Business Directory of Bayonne 1915*. Publisher not identified. On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

Butzer, Karl W.
1982 *Archaeology as Human Ecology*. Cambridge University Press, Cambridge, England.

Carter, Susan B., Roger L. Ransom, Richard Sutch, and Hongcheng Zhao
1993 *Codebook and User's Manual: A Survey of 230 Male Wage-Earners in Ohio, 1879*. Reported in the Third Annual Report of the Ohio Bureau of Statistics of Labor Version 2.1 July 10, 1993, Historical Labor Statistics Project Institute of Business and Economic Research, University of California, Berkeley. Available online at http://eh.net/databases/labor/codebooks/oh03.asc

Centers for Disease Control (CDC)
2004 Smallpox. *Smallpox Disease Overview*. Centers for Disease Control and Prevention. Atlanta, Georgia. Accessed online April 20, 2004, at http://www.bt.cdc.gov/agent/smallpox/overview/disease-facts..asp.

Champion
2003 Champion Company Homepage. Accessed online at http://www.champion-newera.com.

Chapel of Our Lady of the Miraculous Medal
2004 Chapel of Our Lady of the Miraculous Medal homepage. Accessed online at http://www.marypages.com/first.htm.

Coffin, Margaret M.
1976 *Death in Early America.* Thomas Nelson Inc., Tennessee.

Condell, Patricia, and Raymond Mueller, Ph.D.
1989 *A Stage 1 Cultural Resource Survey of the Allied Junction Site Secaucus, Hudson County, New Jersey*. Prepared for Edwards & Kelcey Inc., Livingston, New Jersey.

Conyers, Lawrence B.
1995 The Use of Ground-penetrating Radar to Map the Buried Structures and Landscape of the Ceren Site, El Salvador. *Geoarchaeology* 10:275-299.

2002 Ground-penetrating Radar Discovery at Petra, Jordan. Antiquity 76:339-340.

Cotter, John L., Daniel G. Roberts, and Michael Parrington
1993 *The Buried Past: Am Archaeological History of Philadelphia.* University of Pennsylvania Press, Philadelphia.

Creighton University Medical Center
2004 History of Dentistry. Available online at http://cudental.creighton.edu/htm/history.htm.

Cunningham, John T.
1992 *The East of Jersey: A History of the General Board of Proprietors of the Eastern Division of New Jersey.* New Jersey Historical Society, Newark.

Dallal, Diane
2004 Curator of Archaeology, South Street Museum. Conversation with Gerard Scharfenberger, Berger Archaeologist.

Douglass, L.F.
1841 *Topographical Map of Jersey City, Hoboken, and the Adjacent Country.* 1876 Reprint. On file, New Jersey Room, Jersey City Free Public Library, Jersey City, New Jersey.

Elizabeth Arden
2004 *Profile of a Pioneer*. Accessed online at http://www.elizabetharden.co.za.

Encarta
2004 Influenza. Encarta, MSN. Accessed on-line April 23, 2004, at http://encarta.msn.com/encyclopedia_761557270/Influenza.html.

Feldesman, M.R. and R.L. Fountain
1996 "Race" Specificity and the Femur/Stature Ratio. *American Journal of Physical Anthropology* 100:207-224.

Fike, Richard E.
1987 *The Bottle Book: A Comprehensive Guide to Historic Embossed Medicine Bottles*. Gibbs M. Smith, Inc., Salt Lake City, Utah.

Geismar, Joan H.
1992 *Stage 1A Cultural Resource Survey of the Impact Area of New Jersey Turnpike Secaucus Interchange Project Hudson County, New Jersey*. Prepared for the New Jersey Turnpike Authority through Edwards and Kelcey, Inc..

Gill, George W., and Stanley Rhine (editors)
1990 *Skeletal Attribution of Race: Methods for Forensic Anthropology*. Maxwell Museum of Anthropology.

Godden, Geoffrey A.
1964 *Encyclopedia of British Pottery and Porcelain Marks*. Schiffer Publishing Ltd., Exton Pennsylvania.

Goodman, Seymour D.
1995 *Soil Survey of Bergen County, New Jersey*. United States Department of Agriculture, Soil Conservation Service, Washington, D.C.

Gray, Donald J.
1964 Chapter 9. Oran Systems in Adaption: The Skeleton. In *Handbook of Physiology: A Critical, Comprehensive Presentation of Physiological Knowledge and Concepts, Section 4: Adaption to the Environment*, edited by John Field. American Physiological Society.

Greenhouse Consultants Incorporated
1997 *Stage 1B Archaeological Investigations of the New Jersey Turnpike Secaucus Interchange Project, Potter's Field Portion, Secaucus, Hudson County, New Jersey*. Prepared for Paulus, Sokolowski and Sartor, Inc., Warren, New Jersey, and The New Jersey Turnpike Authority.

Henderson, D.A.
1999 Smallpox: Clinical and Epidemiologic Features. *Emerging Infectious Diseases* 5(4). The Centers for Disease Control and Prevention. Accessed online April 21, 2004, at at http://www.cdc.gov/ncidod/EID/vol5no4/henderson.htm.

Henretta, James W., W. Elliot Brownlee, David Brody, and Susan Ware
1993 *America's History: Volume 1 to 1877.* Worth Publishers, New York.

Hopkins, G.M.
1873 *Atlas of Hudson County. Volume II: Jersey City.* G.M. Hopkins & Company, Philadelphia.

1906 *Atlas of Hudson County.* G.M. Hopkins & Company, Philadelphia. On file, New Jersey Room, Jersey City Free Public Library, Jersey City, New Jersey.

1923 *Atlas of Hudson County. Volume II: Jersey City.* G.M. Hopkins & Company, Philadelphia.

Houart, Victor
1977 *Buttons: A Collector's Guide*. Charles Scribner's Sons, New York

Howell and Company
1910 *Boyd's Jersey City and Hoboken Directory 1910-1911*. Howell and Company. On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

Hudson County Deeds
various Hudson County Deeds. On file, office of the Hudson County Register of Deeds, Jersey City, New Jersey. Hudson County Deeds, Transcription Series. Deeds copied into the Hudson County collection from the Bergen County collection, Bergen having been the parent jurisdiction for Hudson. On file, office of the Hudson County Register of Deeds, Jersey City, New Jersey.

Hudson County Engineering Department
1907 *County Block 2377. Map of Property of the Board of Chosen Freeholders, Formerly North Bergen, Hudson County, New Jersey* (now Borough of Secaucus). May.

1913 *Hudson County Engineering Map*, No. 47, December 27.

1928 *Hudson County Engineering Map*, No. 769, December 20.

1935 *Hudson County Engineering Map*, No. 1188, June 4.

1940 *Revised Map for Landscaping Remodeling of Laurel Hill Secaucus, NJ*, No. WPA 131. May 29.

1941 *Hudson County Engineering Map*, No. 1047A, January 14.

1941 *Hudson County Engineering Map*, No. 1188 Addendum, November 20.

1949 *Plan of Proposed Pavement on Road to Burial Ground, Laurel Hill, Hudson Co., NJ*, No. 1607. February 14.

1950 *Hudson County Engineering Map*, No. 1188 Revised, November.

1950 *Hudson County Engineering Map*, No. 1679B, November 2.

1950 *Hudson County Engineering Map*, No. 1691, November 17.

Hudson County Surveys
various Hudson County Surveys. On file, office of the Hudson County Register of Deeds, Jersey City, New Jersey.

Hughes, Michael O.
2004 History of Artificial Eyes. Available online at http://www.artificialeyeclinic.com/history.html

Iscan, Mehmet Yasar, and Kenneth A. R. Kennedy
1989 *Reconstruction of Life from a Skeleton*. Alan R. Liss, Inc. New York.

Jackson, R.G., and R.H. Price
1974 *Bristol Clay Pipes: A Study of Makers and Their Marks.* Bristol City Museum Research Monograph No. 1. Bristol, England.

Jersey City Free Library Photograph Collection
various Photograph Collections. On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

Katz, Michael B.
1996 *In The Shadow of The Poorhouse: A Social History of Welfare In America*. Basic Books, New York.

Kenny, Kathleen, James B. Petersen Ph.D., John G. Crock Ph.D., Geoffrey A. Mandel, and Chris K. Slesar
2003 *Life and Death in the Northeast Kingdom: Archaeology and History at the Old Burial Ground in St. Johnsbury, Vermont*. Consulting Archaeology Program Report No. 303. University of Vermont, Burlington.

Kerley, Ellis R.
1970 Estimation of Skeletal Age: After about Age 30. In *Personal Identification in Mass Disasters*, edited by T.D. Stewart. Academic Press, Orlando, Florida.

Knight, Glenn B.
n/d *Brief History of the Grand Army of the Republic.* Sons of Union Veterans of the Civil War Web site. Accessed online February 5, 2004 at http://suvcw.org.

Konefes, John L., nd Michael K. McGee
2003 *Old Cemeteries, Arsenic, and Health Safety.* Accessed online at http://www.waterindustry.org.

Kovel, Ralph, and Terry Kovel
1986 *Kovel's New Dictionary of Marks.* Crown Publisher's Inc., New York.

Krementz, Richard
2004 Web site of Richard Krementz Jewelers: http://www.krementzgemstones.com.

Krogman, Wilton Marion, and Mehmet Yasar Iscan (editors)
1986 *The Human Skeleton in Forensic Medicine*. Charles Thomas, Publisher.

Kruglinski, Michael G.
1992 *Shadyside.* On file, Alexander Library, New Jersey Collection, Rutgers University, New Brunswick, New Jersey.

Lafranvoise, Leon
1976 *History of Infantry, Cavalry and Artillery Insignia*. Watson Publishing Company, Steeleville, Missouri.

Lavitt, Wendy
1983 *Dolls.* Alfred A. Knopf, New York.

Lawlor, Baulsir, & Wright
1931 *Topographical Survey of a Portion of Laurel Hill. Hudson County Institutions*. Map No. 1249, October 5.

LeeDecker, Charles H.
2001 The Coffin Maker's Craft: Treatment of the Dead in Rural Eighteenth-Century Delaware. *Journal of Middle Atlantic Archaeology* 17.

LeeDecker, Charles H., Jonathan Bloom, Ingrid Wuebber, Marie-Lorraine Pipes, and Karen R. Rosenberg
1994 *Final Archaeological Excavations at a Late 18th Century Family Cemetery for the U.S. Route 113 Dualization, Milford to Georgetown, Sussex County, Delaware.* Prepared for the Delaware Department of Transportation, Dover, by Louis Berger & Associates, Inc., East Orange, New Jersey. Delaware Department of Transportation Archaeology Series No. 134.

The Louis Berger Group, Inc. [Berger]
2004 *Archaeological Investigations of the Magruder Road Demolition and Repaving and Gunnnison Road Realignment Project*. Prepared for National Park Service, Denver, Colorado, by the Cultural Resource Group, The Louis Berger Group, Inc., East Orange New Jersey.

2002 *Secaucus Interchange Project Potter's Field Disinterment – Reinterment Plan.* Prepared for the New Jersey Turnpike Authority, New Brunswick, New Jersey, by The Louis Berger Group, Inc., East Orange, New Jersey.

Macanka, Jeffrey
2003 Owner/Manager of Introcaso-Angelo Funeral Home, Jersey City, New Jersey. Conversation with Susan D. Grzybowski, Berger Archaeologist.

Manalio & Manalio
1993 Property Survey Lot 2, Block 5 Tax Map, No. 2397-A.93. July 15. Manalio & Manalio, Union City, New Jersey.

Mappen, Marc
2003 Dorothea Dix and the State's First Lunatic Asylum. Available online at http://njtimes.rutgers.edu/dix.htm.

March of Dimes Birth Defects Foundation
2004 Cerebral Palsy. Accessed online at <http//www.marchofdimes.com>.

Melosi, Martin V.
2000 *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present*. The Johns Hopkins University Press, Baltimore.

Merbs, C.F.
1983 *Patterns of Activity-Induced Pathology in a Canadian Inuit Population*. National Museum of Man Mercury Series, Archaeological Survey of Canada No. 119. National Museum of Man, Ottawa, Canada.

Middletown Township Historical Society
n.d. Hudson County Almshouse, Secaucus, NJ. Postcard Image. Middletown Township Historical Society, Leonardo, New Jersey.

n.d. Rear View Hudson County Almshouse, Secaucus, NJ. Postcard Image. Middletown Township Historical Society, Leonardo, New Jersey.

Montgomery, Ward & Co.
1894-1895 *Montgomery, Ward & Co. Fall & Winter 1894-1895 Catalogue & Buyers Guide No. 56.* Edited by Joseph J Schroeder Jr. (1977). DBI Books Inc., Illinois.

Museum of Funeral Customs
2005 Museum of Funeral Customs. Accessed online at http://www.funeralmuseum.org.

Mytum, Harold
In Press Mortality Symbols in Action: Protestant and Catholic Early 18th Century West Ulster. *Historical Archaeology.*

National Oceanographic and Atmospheric Administration (NOAA)
2003 Climatology for Newark, NJ. NOAA-CIRES Climate Diagnostic Center. Accessed online April 29, 2004, at http://www.cdc.noaa.gov/cgi-bin/USclimate.

New Jersey Meadowlands Commission
2004 Master Plan. New Jersey Meadowlands Commission. Accessed online at http://www.meadowlands.state.nj.us/land_use/Publications/Master_Plan.cfm

New Jersey Turnpike Authority (NJTA)
1940 Property Survey, Town Block 4, Secaucus, Hudson County, New Jersey, No. 2012-A. May 29. New Jersey Turnpike Authority, New Brunswick.

1957 New Jersey Turnpike Section 7. Grading, Drainage, and Paving. December. New Jersey Turnpike Authority, New Brunswick.

c. 1970 Aerial Photo. Town of Secaucus. Sheet 16. New Jersey Turnpike Authority, New Brunswick.

1982 Aerial Photo. Town of Secaucus. Sheet 305E. April 16. New Jersey Turnpike Authority, New Brunswick.

2002 Secaucus Interchange Project, Final Design. Town of Secaucus and Jersey City, Hudson County. November. New Jersey Turnpike Authority, New Brunswick.

n.d. New Jersey Turnpike. Contract No. SIP-103 Plans (Phase A/B). New Jersey Turnpike Authority, New Brunswick.

n.d. New Jersey Turnpike. Secaucus Interchange, Section No. 1 ROW Plans. New Jersey Turnpike Authority, New Brunswick.

Noël Hume, Ivor
1970 *A Guide to Artifacts of Colonial North America.* Alfred A. Knopf, New York.

Office of the New Jersey State Climatologist (ONJSC)
2004 Website research. Accessed online at http://climate.rutgers.edu/stateclim.

Office of Technology Assessment (OTA)
1993 The Continuing Challenge of Tuberculosis, OTA-H-574. United States Congress, office of Technology Assessment, Washington, D.C. Accessed online April 20, 2004, at http://www.wws.princeton.edu/cgi-bin/byteserv.prl/~ota/disk1/1993/9347/934704.PDF.

Olhoeft, Gary R.
2004 Ground Penetrating Radar. Accessed online February 18, 2004, at http://www.g-p-r.com/.

Ortner, Donald J.
2003 Identification of Pathological Conditions in Human Skeletal Remains. Academic Press, San Diego.

Ortner, D.J., and W. Putschar
1985 *Identification of Paleopathological Conditions in Human Skeletal Remains*. Smithsonian Institution Press, Washington, D.C.

O'Shea, John
1981 Social Configurations and the Archaeological Study of Mortuary Practices: A Case Study. In *The Archaeology of Death*, edited by Robert Chapman, Ian Kinnes, and Klavs Randsborg. Cambridge University Press, London, England.

Oswald, Adrian
1967 The Archaeology and Economic History of English Clay Tobacco Pipes. Reprinted from *The Journal of the British Archaeological Association, Third Series* XXIII:28-29.

Panati, Charles
1987 *Extraordinary Origins of Everyday Things.* Harper & Row Publishers, New York.

Paulus, Sokolowsli, and Sartor, LLC.
2002 *Potter's Field*. Proposed Interchange Design. New Jersey Turnpike Authority, Secaucus Interchange, Jersey City and Town of Secaucus, Hudson County, New Jersey. January 31.

Pennsylvania Railroad
2004 Corporate Genealogy Pennsylvania Tunnel and Terminal Company. Accessed online February 23, 2004, at http://broadway.pennsyrr.com.

R.L. Polk & Company
1922 *R. L. Polk & Company's Jersey City, Hoboken and Bayonne Directories 1922-1923*. R.L. Polk & Company, New York. On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

Randall, Mark E., and Dennis Webb
1988 *Greenberg's Guide to Marbles*. Greenberg Publishing Company, Inc., Sykesville, Maryland.

Rapaport, Benjamin
1979 *A Complete Guide to Collecting Antique Pipes.* Schiffer Publishing Limited, Atglen, Pennsylvania.

Reed, Gertrude, and Robert E. Henkle
1950 *History of Secaucus.* Secaucus Home News, Secaucus, New Jersey.

Research and Archaeological Management, Inc.
1989 *Cultural Resource Reconnaissance, Hackensack Meadowlands District, Hudson and Bergen Counties, New Jersey.* Prepared for Hackensack Meadowlands Development Commission, Lyndhurst, New Jersey, by Research and Archaeological Management, Inc.

Riordan, Timothy B.
In Press *"Carry Me to Yon Kirk Yard": An Investigation of Changing Burial Practices in the 17th Century Cemetery at St. Mary's City, Maryland.*

Robichaud, Beryl, and Murray F. Buell
1973 *Vegetation of New Jersey: A Study of Landscape Diversity*. Rutgers University Press, New Brunswick, New Jersey.

Rose, Jerome C. (editor)
1985 *Gone to Better Land: A Biohistory of a Rural Black Cemetery in the Post-Reconstruction South.* Arkansas Archaeological Survey Research Series 35, Fayetteville.

Royal College of Surgeons of England
2004 What Is It Made From? Churchill's Dentures. Accessed online at http://www.rcseng.ac.uk/services/museums.

Russel and Erwin
1980 *Illustrated Catalogue of American Hardware of the Russell and Erwin Manufacturing Company.* 1865 edition. Association for the Preservation of Technology.

Sanborn Map Company
1936 *Fire Insurance Map of Secaucus, Hudson County, New Jersey.* Sanborn Map Company, New York.

Saunders, Shelley R.
1992 Chapter 1, Subadult Skeletons and Growth Related Studies. In *Skeletal Biology of Past Peoples: Research Methods*, edited by Shelley R. Saunders and M. Anne Katzenberg Wiley-Liss, pp. 1-20. John Wiley and Sons, New York.

Schulze, Lorine
n/d *Vital Records: Coffin Plates, A Source for Birth & Death Information.* Accessed online at http://www.genhelp.org.

Sears, Roebuck
1897 *Sears, Roebuck Catalogue.* 1897 edition. Edited by Fred L. Israel. Republished by Chelsea House Publishers, New York, 1976.

1902 *Sears, Roebuck Catalogue.* 1902 edition. Republished by Crown Publishers, Inc., New York, 1986.

1927 *Sears, Roebuck Catalogue.* 1927 edition. Edited by Alan Mirken. Republished by Crown Publishers Inc., New York, 1970.

Shaw, William H.
1884 *History of Essex and Hudson Counties, New Jersey*. Compiled by William H. Shaw. Everts & Peck, Philadelphia.

Simon, Donald E
1980 The Worldly Side of Paradise: Greenwood Cemetery. In *A Time To Mourn: Expressions of Grief in Nineteenth-Century America*, edited by Martha V. Pike and Janice Gray Armstrong. The Museums at Stony Brook, New York.

Smith Albert, Lillian, and Katherine Kent
1949 *The Complete Button Book.* Doubleday & Company, Inc., New York.

Snyder, John P.
1969 *The Story of New Jersey's Civil Boundaries 1606-1968.* Bureau of Geology and Topography, Trenton, New Jersey.

Spielman and Brush
1880 *Sanitary and Topographical Map of Hudson County, New Jersey*. Surveyed by Spielman and Brush, Civil Engineers, Hoboken, New Jersey. On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

Stanford University
2004 The Influenza Pandemic of 1918. Accessed online April 19, 2004, at http://www.stanford.edu/group/virus/uda/.

State of New Jersey
2002 P.L. 2002, c. 127 (A-2378) – Criminalizes the desecration of human remains. State of New Jersey 210th Legislature. Accessed online at http://www.judiciary.state.nj.us/legis/pl2002c127.pdf.

Steele, D. Gentry, and Thomas W. McKern
1980 A Method for Assessment of Maximum Long Bone Length and Living Stature from Fragmentary Long Bones. *American Journal of Physical Anthropology* 31: 215-228.

Steinbock, R.T.
1976 *Paleopathological Diagnoses and Interpretation*. Charles C. Thomas, Springfield, Illinois.

Stewart, T.D.
1979 *Essentials in Forensic Anthropology*. Charles C. Thomas, Springfield, Illinois.

Stone, Robert J. and Judith A. Stone
1990 *Atlas of the Skeletal Muscles*. Wm. C. Brown Publishers, Dubuque, Iowa.

Sudbury, Byron
1980 White Clay Pipes From the Old Connellsville Dump, 36Pa140. In *Historic Clay Tobacco Pipe Studies*, vol. 1, edited by Byron Sudbury, pp. 30-35. Privately printed by Byron Sudbury, Ponca City, Oklahoma.

Sudbury, Byron, and Michael A. Pfieffer
1983 Clay Pipes in an 1875 Wm. Demuth & Co. Catalogue. In *Historic Clay Tobacco Pipe Studies*, vol. 2, edited by Byron Sudbury, pp. 72-73. Privately printed by Byron Sudbury, Ponca City, Oklahoma.

Sullivan, Robert
1998 *The Meadowlands: Wilderness Adventures at the Edge of a City*. Random House Inc., New York.

Sydney, J.C.
1849 *Sydney's Map of Twelve Miles Around New York.* On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

Thomas, Clayton L., M.D., M.P.H.
1989 *Taber's Cyclopedia Medical Dictionary*. F.A. Davis Company, Philadelphia.

Trotter, M.
1970 Estimation of Stature from Intact Long Bones. In *Personal Identification in Mass Disasters*. edited by T.D. Stewart, pp. 71-83. Smithsonian Institution Press, Washington, D.C.

Ubelaker, Douglas H.
1978 *Human Skeletal Remains: Excavation, Analysis, Interpretation*. Aldine Publishing Company, Chicago.

United States Department of Agriculture (SCS) (USDA)
1993 *General Soil Map, Essex and Hudson Counties, New Jersey*. Soil Conservation Service, United States Department of Agriculture. Washington, D.C.

United States Department of Commerce
1913 Mortality Statistics 1910. United States Department of Commerce, Bureau of the Census. Government Printing Office, Washington, D.C.

United States Geological Survey [USGS]
1890 *Newark to Paterson East.* 15-Minute Topographic Quadrangle. United States Geological Survey, Washington, D.C.

1940 *Weehawken, NJ.* 7.5-Minute Topographic Quadrangle. United States Geological Survey, Washington, D.C.

1995 *Weehawken, NJ.* 7.5-Minute Topographic Quadrangle. United States Geological Survey, Washington, D.C..

Van Horn C.E., G.J.
1863 *Map of Property of Abel I. Smith and the heirs of Job Smith.* Property division at/near Snake Hill. October 1.

Veit, Richard F., Jr.
1995 "A Piece of Granite That's Been Made in Two Weeks": Terra-Cotta Gravemarkers from New Jersey and New York, 1875-1930. *Markers XII: The Journal of the Association for Gravestone Studies.*

Vendrell, D., V. Pérez Gracia, and R. González Drigo
2003 GPR Survey in Industrial Archaeology Studies. Geophysical Research Abstracts 5. Accessed online February 25, 2004, at http://www.cosis.net/abstracts/EAE03/04436/EAE03-J-04436.pdf.

Wacker, Peter O.
1975 *Land and People: An Historical Geography of Pre-Industrial New Jersey.* Rutgers University Press, New Brunswick, New Jersey.

Walker, Iain C.
1977 *Clay Tobacco Pipes, With Particular Reference to the Bristol Industry*. History and Archaeology No. 11. National Historic Parks and Sites Branch, Parks Canada, Ottawa.

Wand Company
1899 *Wand's City of Bayonne Directory 1899-1900*. The Wand Company, New York. On file, New Jersey Room, Jersey City Free Library, Jersey City, New Jersey.

Weird NJ
2003 The Numbered Dead in Morristown. *Weird NJ* (September):54.

White, Tim D.
2000 *Human Osteology*. Academic Press, San Diego.

Wikipedia
2004 Pandemic. Accessed online April 19, 2004, at http://en.wikipedia.org/wiki/Pandemic.

Winfield, Charles H.
1874 *History of the County of Hudson, New Jersey from its Earliest Settlement to the Present Time*. Kennard & Hay, New York.

Wolfe, Peter E.
1977 *The Geology and Landscapes of New Jersey*. Crane Russack, New York.

Wu, J.L.
1990 The Anthropometric History of Pittsburgh and Allegheny County Pennsylvania, 1890-1945. *Annual of Human Biology* 19(1):79-86.

Zanetakos Associates, Inc., John
1998 Proposed Lease Parcel Map of Lot 2, Block 5. December 11.

Zorn, George & Co.
1892 *George Zorn & Co. Pipes and Smokers Articles.* Fifth edition catalogue, ca. 1892. Copyright and reprinted privately 1989 by S. Paul Jung Jr., Bel Air, Maryland.

CHAPTER 13. GLOSSARY OF TERMS

The following sources provided the basis for most of the definitions in this glossary: Critchley (1978) *Butterworth's Medical Dictionary*, 2nd ed.; Hensyl (1990), *Stedman's Medical Dictionary*, 25th ed.; O'Toole (1992), *Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing & Allied Health,* 5th ed. Additional sources included: Bates and Jackson (1987), *Glossary of Geology*, 3rd ed.; Lawrence (1989), *Henderson's Dictionary of Biological Terms*, 10th ed.; Steele and Bramblett (1988), *Anatomy and Biology of the Human Skeleton*, Hass (1994), *Standards for Data Collection from Human Skeletal Remains*; and *Tabers Cyclopedic Medical Dictionary* (1989).

Abscess- a pus-forming inflammation of the tissues around the tip of the root of a tooth. With prolonged infection, the alveolar bone surrounding the root will deteriorate.

Accessory Transverse Foramina- bifurcated natural openings into, or perforations through, the transverse process of the cervical vertebrae.

Acetabulum- the articular surface for the rotation of the head of the femur; the point of fusion for the three pelvic bones.

Alveolar bone- alveolar process; the superior part of the maxilla and/or mandible that is hollowed out into sockets for the teeth.

Alveolar resorption- removal of alveolar bone, resulting in a decrease in the height of the maxilla and/or mandible, usually as a normal consequence of the aging process.

Alveolus (pl. **alveoli**)**-** a tooth socket; one of the holes in the tooth-bearing alveolar process of the maxilla or mandible into which each tooth is attached by its root.

Anaerobic- the absence of molecular oxygen. An anaerobic environment tends to inhibit organic decomposition.

Ankylosis- complete immobility (fusion) of a joint, resulting from pathological changes in that joint or of the structures associated with it.

Anterior- opposite of posterior; ventral; the front surface of the body or a part thereof. Often used to indicate the position of one structure relative to another, e.g., the sternum is anterior to the thoracic vertebrae.

Anterolateral- In front and to one side.

Antimere- one of the halves of a bilaterally symmetrical structure; especially used of teeth, e.g., the antimere of the left maxillary canine is the right maxillary canine.

Aperture- an orifice or an opening creating bony spaces or canals.

Apical Bone- an ossicle located at lambda, within the posterior fontanelle.

Archaeology- the study of human social organization through the systematic excavation and analysis of past material culture.

Arthrosis- trophic degeneration of a joint.

Articular- relating to the normal anatomical points of contact between adjacent bones, i.e., joints.

Artifact - any humanly produced or modified material.

Ascending ramus- the broad vertical projections on the mandible that terminate posteriorly with the condyles for articulation with the temporal bones and anteriorly with the non-articular coronoid processes.

Assemblage- the artifact collection from a site that shares a set of attributes, e.g., lithic assemblage, ceramic assemblage, prehistoric assemblage.

Asterionic- a craniometric point where the lambdoid, occipitomastoid, and parietomastoid sutures join.

Asymmetry- a lack of symmetry.

Atlas Bridging- there are two types of atlas bridging: (1) a lateral bridge occurs when bony spicules unite the lateral aspect of the superior articular facet of the first cervical vertebrate with the lateral mass; and (2) a posterior bridge that occurs when bony spicules unite the posterior aspect of the superior articular facet of the first cervical vertebrate with the posterior arch.

Atlas- the first cervical vertebra.

Atrophy (adj. **atrophic**)**-** a decrease in size of a normally developed organ or tissue; wasting.

Auditory Meatus- the opening of the ear canal; also called the acoustic meatus, located posterior to the zygomatic process but anterior to the mastoid process.

Auricular Surface- the ear-shaped roughened surface for the sacroiliac joint located on the ilium.

Basilar- pertaining to the base, usually the base of the skull

Basilar Suture- the suture located between the occipital and sphenoid bone.

Basioccipital synchondrosis- the cartilage at the articular surfaces of the basilar suture becomes ossified or permanent.

Basion Bregma Height- direct distance from the lowest point on the anterior margin of foramen magnum to bregma.

Basion Prosthion Length- direct distance from basion to prosthion.

Basion- the midline point on the anterior margin of the foramen magnum.

Bevel- a surface having a sloped or slanted edge.

Biauricular Breadth- the least exterior breadth across the roots of the zygomatic process, wherever found.

Bicondylar Breadth- direct distance between the most lateral points on the two condyles.

Bifurcation- a separation into two branches; the point of forking.

Bigonial Width- direct distance between right and left Gonion.

Biological distance- "biodistance"; measurement of population divergence based on phenotypic traits. Skeletal biological distance studies examine variation in bone or tooth shape and form in order to define patterns that are thought to reflect genetic relatedness within or between past populations.

Bi-orbital Breadth- direct distance between right and left ectoconchion.

Bizygomatic Diameter- direct distance between most lateral points on the zygomatic arches.

Bladed fracture- refer to sharp force trauma, e.g., knives and axes.

Bowed- characterized by smooth, gradual curvature.

Bregma- the ectocranial midline point where the coronal and sagittal sutures intersect.

Bregmatic Bone- an additional bony ossicle located at bregma.

Buccal- pertaining to, adjacent to, or in the direction of the cheek.

Calcaneal spur- a bony growth or spur on the calcaneus; heel spur.

Calcaneus Maximum Length- distance between the most posteriorly projecting point on the tuberosity and the most anterior point on the superior margin of the articular facet for the cuboid measured in the sagittal plane and projected onto the underlying surface.

Calcaneus Middle Breadth- distance between the most laterally projecting point on the dorsal facet and the most medial point on the sustentaculum tali.

Calcaneus- heel bone.

Callus- callus formation typically accompanies fracture healing. A recently formed callus will be composed of woven bone; sclerotic, integrated bone formation is indicative of an episode earlier in the lifetime of the individual.

Calvaria (pl. **calvariae**)**-** the upper, domelike roof of the skull, consisting of the superior parts of the frontal, parietal, and occipital bones.

Cancellous bone- osseous tissue which consists of a network of rods, plates, or tubes (the trabeculae), with the spaces between the trabeculae filled with marrow, characteristically located in the epiphysis of long bones.

Canine Fossa- the wide, shallow depression on the external surface of the maxilla superolateral to the canine tooth.

Caries- decay of bones or teeth resulting in the softening, discoloration, and destruction of the original material.

Carpals- the skeleton of the wrist consists of eight carpal bones, arranged in two rows of four. From the thumb to the little finger, the proximal or first row consists of navicular, or scaphoid, lunate, triquetal, and the pisiform. The distal or second row consists of Greater multangular, or trapezium, lesser multangular, or trapziod, capitate, and hamate.

Cartilage- a specialized type of dense connective tissue consisting of cells embedded in a ground substance or matrix. The matrix is form and compact, rendering it capable of withstanding considerable pressure or tension. Cartilage has a bluish-white or gray color and is semi-opaque; it has no blood supply of its own.

Caudal- pertaining to any tail-like structure.

Cavitation- the formation of a cavity or cavities in an organ or tissue (e.g., teeth), usually as the result of a disease.

CEJ- cemento-enamal junction; the line of contact between the enamel and cementum of a tooth.

Cementum- the calcified tissue that immediately surrounds the dentin of the root and neck of a tooth, and that assists in holding the tooth in its socket (alveolus).

Centrum- the body of a vertebra, exclusive of the bases of the neural arches (pedicles).

Cerebral Palsy- a bilateral, symmetrical, non-progressive paralysis resulting from developmental defects in brain or trauma at birth.

Chamfered- the removal of a square edge to create a beveled edge, as in ceramic design.

Chi-square- a statistical test that measures the strength of the relationship between two or more sets of data.

Chin Height- direct distance from infradentale to gnathion.

Circumferential- encircling; relating to a circumference or a perimeter.

Clavicle Maximum Length- maximum distance between the most extreme ends of the ends of the clavicle.

Clavicle Sagittal (Anterior-Posterior) Diameter at Midshaft- distance from the anterior to the posterior surface at midshaft.

Clavicle Vertical (Superior-Inferior) Diameter at Midshaft- distance from the superior to inferior surface at midshaft.

Clavicle- or collar bone, is a long bone with a shaft and two ends. It is situated immediately above the first rib and extends laterally from the upper border of the manubrium (sternum) and backward to the acromion of the scapula. It functions as a strut or prop to the shoulder, thereby holding the scapula and upper limb laterally, backward, and slightly upward.

Cloaca- an opening in the sheath covering necrosed bone.

Coalesce- to grow together or fuse; to unite into one body or mass.

Collagen- a fibrous structural protein that forms the white fibers of bone, cartilage, and all other connective tissue.

Commingled- bone assemblages containing the remains of several individuals.

Comminuted fracture- a fracture in which the bone is splintered or crushed.

Compact bone- dense osseous tissue. Forms the cortex of all bones, and consists largely of concentric lamellar osteons and interstitial lamellae.

Complete fracture- a bone having suffered a high enough stress level to completely break the bone into two or more parts.

Compression fracture- the type of break in which the bone is crushed. This typically occurs when the bone is osteoporotic. Aged adults most commonly suffer compression fractures of the vertebrae.

Condylar Canal- the canal opening within the condylar fossa, posterior to the occipital condyles

Condyle- a round articular surface located at the distal end of certain long bones (e.g., the femoral condyles, which articulate with the tibia).

Congenital- existing at birth, referring to certain hereditary mental or physical traits, anomalies, malformations, disease, etc.

Coronal Ossicle- a small sutural bone.

Coronoid Fossa- an oval depression on anterior surface of distal end of humerus. The coronoid fossa receives the coronoid process of the ulna.

Coronoid Process- a bony projection that is shaped like a crow's beak located at the proximal end of the ulna. This process forms the anterior portion of the semi lunar notch. The coronoid process also refers to the anterior upper end of the ramus of the mandible that serves for the attachment of the temporalis muscle.

Corpus- body.

Cortical bone- compact bone found on the outer surface of a bone, between the endosteum and periosteum.

Crania (pl. of **cranium)-** a skull without its mandible.

Cranial Base Length- direct distance from nasion to basion.

Cranial suture closures- although cranial sutures generally close (fuse) with increasing age, there is considerable variability in closure rates. Such variation reduces the value of suture closure patterns for age determination. Information on suture closure is, however, useful when other criteria are not available or when used in conjunction with other attributes.

Cranial sutures- serrated interlocking joints of the skull.

Cranial vault- the cranial vault is the arched or dome like part of the skull that is composed of the following bones: the parietals, the occipital bone, the temporals, and the sphenoid bone

Craniosynostosis- premature ossification of the skull and obliteration of the cranial sutures.

Cranium (pl. **crania**)- a skull without its mandible.

Dacryon- the point on the medial border of the orbit at which the frontal, lacrimal and maxilla intersect: dacryon lies at the intersection of the lacrimo-maxillary suture and the frontal bone. There is often a small foramen at this point.

Datum- fixed point of reference to maintain vertical and horizontal coordinate system.

Deciduous dentition- primary dentition, "milk teeth," "baby teeth"; in humans the 20 teeth that are present before the permanent teeth erupt, after which point they are shed.

Degenerative- the deterioration or impairment of an organ or part in structure of cells and in the substances of which they are a part.

Degenerative Joint Disease- a non-inflammatory, chronic, progressive pathological condition characterized by the loss of joint cartilage and subsequent lesions resulting from the direct interosseous contact within diarthrodial joints.

Demography- the study of vital statistics (e.g., fertility and mortality) within populations.

Dental attrition- dental wear; the natural process of wearing down the biting (occlusal) surfaces of the teeth by chewing abrasive foods.

Dental calculus- tartar; a hard, stone-like concretion, varying in color from creamy yellow to brown or black, that forms on the teeth through the calcification of dental plaque.

Dental eruption- the breaking through of a tooth through the gum; the cutting of a tooth.

Dentin- dentine, dentinum; a calcified tissue containing about 20 percent organic matrix (mostly collagen) and 70 percent inorganic matter (mostly hydroxyapatite). It forms the mass of the tooth surrounding the pulp, and is covered with enamel on the crown and cementum in the root of the tooth. **Primary dentin** is dentin that develops until the formation of the root of the tooth is completed; **secondary dentin** is dentin that forms after the formation of the tooth's root is complete.

Diachronic- changes as they happen or develop over time.

Diagenesis (adj. **diagenetic**)- the chemical, physical, and biological changes undergone by a bone after its initial deposition, exclusive of surface alteration (weathering).

Diagnostic- a trait or style that allows an artifact to be characterized as a known type or subtype.

Diaphysis- the shaft of a long bone, as distinguished from the extremities (epiphyses) or outgrowths (apophyses).

Diffuse Idiopathic Skeletal Hyperostosis (DISH)- an ossifying diathesis producing ankylosis of the spine owing to ligament ossification without inter-vertebral disk disease.

Dimorphic- anatomical variation in a species by sex.

Diploe- spongy (Cancellous) bone located between the outer and inner compact layers (tables) of the flat cranial bone.

Discontinuous variables- categorical or discrete variables; nonmetric traits, which are usually scored as present, partially present, or absent.

Disinterment- the removal of remains from a grave. In the context of the Potter's Field project, represents the removal of all human remains from the burial ground.

Distal Condyle- the rounded protuberance at the end of a long bone forming an articulation, furthest from the center of the body; opposite of proximal condyle.

Distal Head- a projection on a bone that articulates with another bone, furthest from the center of the body; opposite of proximal head.

Distal- opposite of proximal; situated away from the center of the body, remote from the point of attachment or origin. Often used to refer to a structure that is farther from the trunk (main part of the body) than another, e.g., the hands are distal to the forearm.

DNA- deoxyribonucleic acid; the acid found in cell nuclei that forms the basic structure of the genes.

Dorsal Border- the back edge; referring to a structure, landmark, or part of a bone.

Eburnation- the smooth, polished appearance of exposed subchondral bone caused by bone-on-bone contact at articular surfaces as a result of degenerative joint disease.

Ectoconchion- the intersection of the most anterior surface of the lateral border of the orbit and a line bisecting the orbit along its long axis.

Ectocranial- relating or belonging to the external surface of flat cranial bones.

Edentulous- without teeth.

Embossed - designs or lettering molded in relief on ceramic vessels or glass bottles.

Enamel hypocalcification- deficient or defective enamel maturation caused by local, systemic, or hereditary factors, and characterized by low mineral content.

Endocranial- relating or belonging to the internal surface of the flat cranial bones.

Endosteum (adj. **endosteal**)- the membranous layer of high vascular connective tissue lining the medullary cavity of bone.

Enthesophytes- projections or spicules of bone at sites of tendinous or ligamentous attachment.

Epicondyle- a projection from a long bone located at above or upon the distal articular surfaces (the condyles).

Epiphyseal unions- a center for ossification at each extremity of long bones. It is possible to judge the biological age of a child from the development of these ossification centers.

Epiphysis- a secondary bone-forming center and attached to a bone and separated from it by cartilage, commonly located at the ends of long bones, on the margins of certain flat bones, and at some major tubercles and processes. After a certain period of development, which differs for each epiphysis, it fuses to the main bone, and no further growth occurs at that point.

Epipteric Bone- a bone located at the junction of the frontal, parietal, temporal, and sphenoid bones.

Erosion- any superficial destructive process; the wearing away of the external surface of a bone.

Exhumation- the removal of remains from a grave. In the context of the Potter's Field project, represents the excavation of a single burial.

Exophytic- referring to a lesion or tumor that grows outward from the surface of a bone.

Exostosis- a benign new growth protruding from the surface of a bone and characteristically capped by cartilage. Occurs most often on long bones, but may also be found on flat bones. Usually forms in response to chronic irritation, as from infection, trauma, or osteoarthritis.

External auditory meatus- the lateral, outer opening of the external auditory canal; the ear opening.

Eye orbits- the bony pyramid-shaped cavity of the skull that contains and protects the eyeball.

Eye-Ear Plane (also called **Frankfurt Horizontal** [FH])- a plane of orientation in which to take measurements for comparative purposes. Frankfurt Horizontal is defined by the right and left porion points and the left orbitale.

Femoral head- the ball-shaped proximal articular surface at the proximal end of the femur or thighbone.

Femur Anterior Posterior Midshaft Diameter- distance between anterior and posterior surfaces measured approximately at the midpoint of the diaphysis at the highest elevation of linea aspera.

Femur Anterior Posterior Subtrochanteric Diameter- distance between anterior and posterior surfaces at the proximal end of the diaphysis, measured perpendicular to the medial-lateral diameter.

Femur Epicondylar Breadth- distance between the two most laterally projecting points on the epicondyles.

Femur Maximum Head Diameter- the maximum diameter of the femur head, wherever it occurs.

Femur Maximum Length- distance from the most superior point on the head of the femur to the most inferior point on the distal condyles.

Femur Medial Lateral Diameter- distance between medial and lateral surfaces of the proximal end of the diaphysis at the point of its greatest lateral expansion below the base of the lesser trochanter.

Femur Midshaft Circumference- circumference measured at the level of the midshaft diameters.

Femur- the femur is the largest and longest bone in the skeleton and articulates with the hip bone superiorly and with the tibia inferiorly (at the knee).

Fibula Maximum Diameter at Midshaft- maximum diameter at midshaft.

Fibula Maximum Length- maximum distance between the most superior point on the fibula head and the most inferior point on the lateral malleolus.

Fibula- situated on the lateral side of the lower leg, the fibula is the most slender of all the long bones in proportion to its length. It articulates with the tibia proximally (at the knee) and with the tibia and talus distally (at the ankle).

Focal- limited to one area or part of an organ or of the body; localized.

Foramen Lacerum- the opening formed by the juncture of the occipital, sphenoid, and temporal bones.

Foramen Magnum Breadth- distance between the lateral margins of foramen magnum at the points of greatest lateral curvature.

Foramen Magnum Length- direct distance from basion to opisthion.

Foramen Magnum- the large oval hole in the base of the skull.

Foramen Ovale- foramen ovale (sphenoid bone) open to foramen Lacerum.

Foramen (plural **foramina**)- a natural opening into, or perforation through, a bone.

Fossa-a depression.

Fracture- structural failure (breaking) of bone or cartilage.

Frankfurt horizontal plane-eye-ear auriculo-infraorbital plane, infraorbitomeatal plane; a standard craniometric reference plane which passes through the lower margins of the orbits (the orbitale) and the upper margins of the external acoustic meatuses (the porion).

Frontal bone- forehead bone.

Frontal Chord- direct distance from Nasion to bregma taken in the midsagittal plane.

Frontomalar Suture- the suture between the frontal and malar bones.

Frontotemporale- the point where the temporal line reaches its most anteromedial position on the frontal.

Fusiform- spindle-shaped; tapered at both ends.

Geochemical- chemical processes taking place within soils or sediments.

Gingival regression- receding of the soft tissues (gums) from around the teeth.

Glabella- the most anterior midline point on the frontal bone, usually above the frontonasal suture.

Glenoid cavity- the socket that receives the head of the humerus below the acromion at the junction of the superior and auxiliary borders.

Glenoid Fossa- the fossa of the temporal bone that receives the condyle or capitulum of the mandible and/or the fossa in the glenoid cavity of the scapula.

Gnathion- the most inferior midline point on the mandible.

Gonial angle- the angle formed by the meeting of the thick posterior border of the horizontal ramus and the inferior border of the ascending ramus.

Gonion- a point along the rounded posteriorinferior corner of the mandible between the ramus and the body.

Gracile- slight or slender, delicate, thin

Grave fill- soil within a grave feature, such as a well, cistern, or grave; either deliberately placed or transported by erosion.

Grave goods- items included in a burial, usually of a personal nature associated with the deceased.

Greater sciatic notch- a large notch on the posterior border of the hip bone between the posterior inferior iliac spine and the spine of the ischium.

Greenstick fracture- partial fracture typically occur as a result of bending stresses in juveniles. Adult ribs are also a frequent site of greenstick fractures.

Groove- sometimes used synonymously with "sulcus"; an elongated, usually shallow depression, hollow or furrow.

Head- a rounded, smooth eminence for articulation.

Hemategenous- the development of blood cells.

Hemotoma- a swelling or mass of blood (usually clotted) confined to an organ, tissue, or space and caused by a break in a blood vessel.

Heritability- a structural term used to denote the proportion of phenotypic variance that is caused by variance in genotypes.

Herniation- development of a protrusion or projection of an organ or a part of an organ through the wall of the cavity that normally contains it.

Histology- microanatomy; the science concerned with the minute structure of cells, tissues, and organs in relation to their function.

Humerus Epicondylar Breadth- distance of the most laterally protruding point on the lateral epicondyle from the corresponding projection of the medial epicondyle.

Humerus Maximum Diameter at Midshaft- maximum diameter at midshaft.

Humerus Maximum Length- direct distance from the most superior point on the head of the humerus to the most inferior point on the trochlea.

Humerus Minimum Diameter at Midshaft- minimum diameter at midshaft.

Humerus Vertical Diameter of Head- direct distance between the most superior and inferior points on the border of the articular surface.

Humerus- the humerus is the largest and longest bone in the arm. It articulates proximally with the scapula (at the shoulder) and distally with the radius and ulna (at the elbow).

Hydrology- the study of water movement principally through soil and rock strata.

Hyperostosis frontalis- an abnormal growth of osseous tissue (osteoma), usually in multiples and arising on the internal area of the frontal bone.

Hyperparathyroidism- condition owing to increased activity of the parathyroid glands.

Hyperplasia- increase in the number of cells of a tissue or organ, excluding tumor formation.

Hypertrophy- increase in bulk (volume) of a tissue or organ as the result of an increase in the function of that tissue. May be restricted to denote greater bulk through increase in size, but not number, of cells of the affected tissue element.

Hypoglossal Canal- the hypoglossal canal is located superior to the occipital condyle, normally at an angle perpendicular to the main axis of the condyle.

Idiopathic- a condition without clear pathogenesis, or disease without recognizable cause, as of spontaneous origin.

Iliac- relating to the illium.

Iliac Crest- the hip. The upper free margin of the illium.

Iliac Spine- one of four spines of the illium, namely the anterior, and posterior inferior spines and the anterior and posterior superior spines.

Impaction- a condition of being tightly wedged into a part, as eruption of a tooth blocked by other teeth; overloading of an organ, as the feces in the bowels.

***In situ*-** Latin for "in position," or localized. In the normal place without disturbance or invading the surrounding matrix; the context of an artifact in its original place of discovery.

Inca Bone- failure of fusion of the primary ossification centers of the squamous portion of the occipital bone. Most commonly a transverse suture divides the squamous portion at the point of the highest nuchal line. It is important to distinguish the Inca bone from the presence of an ossicle at lambda, which is smaller and centered in the posterior fontanelle.

Incisial- cutting.

Incisors- teeth designed for cutting. The incisors are the two teeth on either side of the midline of both jaws. They are characterized by single roots and crowns with a sharp occlusal (mesiodistal) ridge or edge.

Inferior- opposite of superior; situated lower down (near the soles of the feet) in relation to a specific structure or reference point, situated below or directly downward.

Infradentale- the midline point at the superior tip of the septum between the mandibular central incisors.

Infraorbital Suture- located on the orbital and facial surfaces, through presence on the facial surface only will be scored. A complete suture extends from the orbital margin to the infraorbital foramen.

Inner table of skull- the inner of the two layers of compact bone that enclose the diploe of the skull.

Innominate- the hipbone, composed of the ilium, ischium, and pubis. United with the sacrum and coccyx by ligaments to form the pelvis.

Internment- burial.

Interorbital breadth- direct distance between right and left dacryon.

Interosseous Crest- the somewhat sharp edge on the bone shaft directed toward an adjacent bone and serving for attachment of an interosseous ligament. (An interosseous crest occurs on the radius and ulna and on the tibia and fibula.)

Interproximal- lying between adjacent surfaces. In dentistry, referring to the spaces between adjacent teeth.

Involucrum- a sheathing or covering. The covering of newly formed bone enveloping the sequestrum in infection of the bone.

Ironstone- a hard, refined earthenware ceramic with white paste under clear glaze manufactured from early nineteenth century to present.

Ischial Tuberosity- blunt, rough, massive posteroinferior corner of the os coxae.

Ischiopubic ramus- the thin flat strip of bone connecting the pubis to the ischium.

Ischium- part of the hip bone.

Kyphosis- also called "humpback"; a deformity of the spine characterized by extensive forward curvature (flexion), especially in the thoracic region.

Labial- toward the lips; relating or belonging to the lips.

Lambda- the ectocranial midline point where the sagittal and lambdoidal sutures intersect.

Lambdoid Ossicle- the small bone at the junction of the lambdoid and sagittal sutures.

Lateral Bridge- bony spicules that unite the lateral aspect of the superior articular facets of the first cervical vertebrate with the lateral mass.

Lateral Epicondyle- the large protruding knob at the distal end of the femur.

Lateral Malleolus- the laterally rounded portion of the distal end of the fibula; the outer "ankle bone."

Lateral- toward the sides of the body; further from the midline or mid-sagittal plane.

Lesion- a broad term referring to any pathological or traumatic discontinuity of tissue or loss of function of a part, including wounds, sores, ulcers, tumors, and any other tissue damage; one of the individual points or patches of a multifocal disease.

Lesser Trochanter- the smaller and more inferior of the two protuberances between the neck and the shaft of the femur; a separate center of ossification.

Lifetable- a way of expressing demographic data used by life insurance companies to summarize population statistics and to estimate life expectancy for living population using one-year intervals and five-year intervals for prehistoric populations. Modern life tables use known ages, whereas prehistoric life tables are based on estimated ages at death.

Lingual- next to or towards the tongue; pertaining to the tongue.

Lipping- the formation of an overgrowth of bone that projects beyond the margin of the affected articular surface, as in osteoarthritis.

Loam- a soil type intermediate between fine-grained and coarse-grained.

Lobulated- divided into small lobes or subdivisions of lobes, which are often separated from one another by connective tissue or fissures.

Long Bones- collective term for the bones of arms and legs, specifically, the humerus, radius, ulna, femur, tibia, and fibula.

Lysis- disintegration or dissolution of tissue.

Lytic- related to lysis or a lysin

Malar- cheek.

Malocclusion- the lack of occlusion, or the abnormal occlusion, existing between the teeth of the upper and lower jaws.

Mandible- or lower jaw, is the largest and strongest bone of the face. It is the most moveable bone of the skull, articulating through the condyles with the temporal bones at the temporomandibular joints. The bone supports the lower teeth, which meet those of the maxilla at the occlusal plane.

Mandibular Angle- angle formed by the inferior border of the corpus and the posterior border of the ramus.

Mandibular Body- the anterior and horizontal portion of the bone that is shaped like a horseshoe. Also known as the horizontal ramus.

Mandibular Body Breadth- maximum breadth measured in the region of the mental foramen perpendicular to the long axis of the mandibular body.

Mandibular Body Height- direct distance from the alveolar process to the inferior border of the mandible perpendicular to the base at the level of the mental foramen.

Mandibular Condyle- oval in form, joins the temporal bone through the articular surface (the head). It is the posterior projection of the ascending ramus.

Mandibular Corpus- the thick bony part of the mandible that anchors the teeth (horizontal ramus)

Mandibular Ramus- the vertical part of the mandible that rises above the level of the teeth and articulates with the cranial base.

Mandibular Torus- bony ridge or series of nodules that develop on the lingual aspect of the lower jaw near the premolars and canines.

Mandibular Length- distance of the anterior margin of the chin from a center point on the projected straight line placed along the posterior border of the two mandibular angles.

Manubriocostal- the junction of the manubrium and the first pair of costal cartilages.

Manubrium- the upper segment of the sternum articulating with the clavicle and first pair of costal cartilage.

Mastoid Foramen- opening in the mastoid part of the temporal bone.

Mastoid Length- vertical projection of the mastoid process below and perpendicular to the eye-ear (Frankfurt) plane.

Mastoid process- nipple-shaped process of mastoid portion of temporal bone extending downward behind the external auditory meatus.

Maxilla- one of the largest bones of the face, it supports the upper teeth and help to form the orbits, the hard palate, and the nasal fossa.

Maxillo-Alveolar Breadth- maximum breadth across the alveolar borders of the maxilla measured on the lateral surfaces at the location of the second maxillary molars.

Maximum Cranial Breadth- maximum width of skull perpendicular to midsagittal plane wherever it is located, with the exception of the inferior temporal lines and the area immediately surrounding them.

Maximum Cranial Length- distance between glabella and opisthocranion in the midsagittal plane, measured in a straight line.

Maximum Ramus Breadth- distance between the most anterior point on the mandibular ramus and a line connecting the most posterior point on the condyle and the angle of the jaw.

Maximum Ramus Height- direct distance from the highest point on the mandibular condyle to Gonion.

Medial Epicondyle- the eminence at the distal articular end of humerus closest to the body proximal to the trochlea (articular surface for the ulna).

Medial Malleolus- the projection on the medial side of the distal tibia that forms the subcutaneous knob at the ankle.

Medial- mesial; nearer the midline or mid-sagittal plane of the body.

Medullary cavity- the part of a bone that contains marrow.

Meningocele- congenital hernia in which the meninges protrude through an opening of the skull or spinal column.

Meninges- the three membranes investing the spinal cord and brain: the dura mater (external), the arachnoid (middle), and the pia mater (internal).

Mental eminence- the chin. The anterior projection of the inferior border of the body of the mandible.

Mental Foramen- opening found on the body of the mandible.

Metabolic- the sum of all physical and chemical changes that take place within an organism; all energy and material transformations that occur within living cells.

Metaphysis- portion of a developing long bone between the diaphysis or shaft and epiphysis; the growing part of a bone.

Metopic Suture- located on midline of the frontal bone, from Bregma to Nasion. Persistence of sutura interfrontalis, which usually closes by the eighth year.

Microcephalic- abnormal smallness of the head.

Mid-sagittal Plane- median plane; the vertical plane that divides the body along its midline into symmetrical halves.

Minimal Frontal Breadth- direct distance between the two frontotemporale.

Minimum Ramus Breadth- least breadth of the mandibular ramus measured perpendicular to the height of the ramus.

MNI- minimum number of individuals.

Morphology- science of structure and form without regard to function.

Mortality curve- demographic profile of a population using death rate.

Mycobacterium-a genus of acid-fast organisms belonging to the Mycobacteriaceae family that includes the causative organisms of tuberculosis and leprosy.

Myelocele- a form of spina bifida with spinal cord protrusion.

Myelomeningocele- spina bifida with portions of the spinal cord and membranes protruding.

Mylohyoid Bridge- bony bridge over the mylohyoid canal of the mandible, either in region of mandibular foramen or approximately in the center of the grove.

Mylohyoid Canal- a channel on the ascending ramus of the mandible.

Myositis ossificans traumatica- inflammation of muscle tissues, especially voluntary muscles, marked by ossification of muscle tissue.

Nasal- pertaining to the nose.

Nasal Aperture- nasal opening between the eye orbits

Nasal breadth- the maximum breadth of the nasal aperture.

Nasal Breadth- maximum breadth of the nasal aperture.

Nasal guttering- the shape of the base of the nose has a gutter and lacks a nasal sill. Characteristic of an African American.

Nasal Height- direct distance from Nasion to the midpoint of a line connecting the lowest points of the inferior margin of the nasal notches.

Nasal sill- a bony dam just below the base of the nasal aperture. This is a Caucasian trait.

Nasal spine- the small medial process on the lower lip of the nasal aperture. A thin projection of bone on the midline at the inferior margin of the nasal aperture.

Nasion- the point of intersection between the frontonasal suture and the midsagittal plane.

Neurotrophic- pertaining to the influence of nervous impulses upon the nutrition and function of an organ or structure.

Non-metric trait- dichotomous, discontinuous, epigenetic traits; non-pathological variations of skeletal tissues that can be better classified as present or absent (or as a point on a morphological gradient, e.g., small to large) rather than qualified by a measurement.

Non-union fracture- a broken bone that fails to heal and re-unite.

Notches- a rather deep indentation or narrow gap in the edge of a structure.

Nuchal crest- a well-defined bony ledge or hook on the external surface of the occipital bone. A large nuchal crest suggests a male individual.

Nutrient Foramen- a major vascular opening between the exterior of a bone and the medulla; notable foramina are on appendicular bones, mandible and parietals.

Obelion- a craniometric point on the sagittal suture between the two parietal foramina.

Obturator foramen- a large foramen on the coxa bounded by the pubis and ischium.

Occipital Bone- situated in the posterior and inferior part of the cranium, the occipital bone is connected by sutures with the two parietals, the two temporals and the sphenoid. This is the only bone of the skull that articulates with the post cranial skeleton.

Occipital Chord- direct distance from lambda to opisthion taken in the midsagittal plane.

Occipital protuberance- lies on the ectocranial midline where the occipital and nuchal planes meet. It is highly variable in appearance and heavier and more prominent in male individuals.

Occipito-Mastoid Suture- suture between the occipital bone and mastoid portion of temporal bone.

Occipito-Mastoid Suture Ossicle- a non-metric trait that is a sutural bone that is located in the suture between the temporal and occipital bones.

Occlusal- relating to the chewing surfaces (i.e., the crowns) of the premolar and molar teeth, and the contacting surfaces of the incisors and canines; also refers to a position toward the hypothetical plane passing between the maxillary and mandibular teeth when the upper and lower jaws are brought together.

Occlusion- the contact between upper and lower teeth that occurs when the jaws close.

Olecranon Fossa- the large depression on the posterior surface of the distal humerus for the olecranon process of the ulna.

Olecranon- ulnar process at the elbow.

Opisthion- the midline point at the posterior margin of the foramen magnum.

Opisthocranion- instrumentally determined most posterior point of the skull not on the external occipital protuberance.

Orbital Breadth- laterally sloping distance from dacryon to ectoconchion.

Orbital Height- direct distance between the superior and inferior orbital margins.

Orbits- the bony pyramid-shaped cavity of the skull that contains and protects the eyeball.

Os Coxae- hip bone.

Os Coxae Height- distance from the most superior point on the iliac crest to the most inferior point on the ischial tuberosity.

Os Coxae Iliac Breadth- distance from the anterior-superior iliac spine to the posterior-superior iliac spine.

Os Coxae Ischium Length- distance from the point in the acetabulum where the three elements meet to the point in which the axis of the ischium crosses the ischial tuberosity.

Os Coxae Pubis Length- distance from the point in the acetabulum where the three elements of the os coxae meet to the upper end of the pubic symphysis.

Ossicles- small bones.

Ossification- formation of bone substances. Conversion of other tissue into bone.

Osteitis- inflammation of a bone.

Osteoarthritis- a chronic disease involving the joints, especially those bearing weight. Characterized by destruction of articular cartilage, overgrowth of bone and lipping and spur formation, and impaired function.

Osteoblast- a cell of mesodermal origin that is concerned with the formation of bone.

Osteochondritis dissecans- a condition affecting a joint in which a fragment of cartilage and its underlying bone become detached from their articular surfaces. Occurs most commonly in the knee joint.

Osteological- pertaining to the study of bones.

Osteology- the science of the structure and function of bone.

Osteolysis- a softening and destruction of bone without osteoclastic activity; it occurs within compact bone and results from a breakdown of the organic matrix and subsequent leaching out of the inorganic fraction, probably caused by localized metabolic disturbances, vascular changes, or release of hydrolytic enzymes by osteocytes.

Osteometrics- relating to the measurement of bones.

Osteomyelitus- inflammation of bone, especially the marrow, caused by a pathogenic organism.

Osteophyte- small abnormal bony outgrowth or protuberance, normally located in areas where ligaments attach to bone.

Osteophytosis- a degenerative disease of the vertebral bodies.

Osteoporosis- a general term for describing any disease process that results in reduction in the mass of bone per volume. The reduction is sufficient to interfere with the mechanical support function of bone.

Osteosclerosis- hardening of bone with increased heaviness.

Oval window- oval-shaped aperture in the middle ear that fits the base of the stapes.

Paget's Disease- Osteitis deformans; chronic resorption of bone and deposition of osteoid tissue periosteally and within the marrow, producing distortion of skeletal elements, most often the skull, spine, pelvis, and tibia.

Palatine suture- a suture that divides the palate into two symmetrical halves.

Palate- the maxilla, or roof of the mouth.

Parietal bone- forming a large part of the roof and sides of the cranium, the parietal bone is interposed between the frontal and occipital bones. It articulates with the occipital, frontal, sphenoid, temporal and other parietals.

Parietal Chord- direct distance from bregma to lambda taken in the midsagittal plane.

Parietal Notch Bone- an ossicle located within the parietal notch, between the squamous portion of the temporal and parietal bones. This is a non-metric trait.

Patella- knee cap.

Pelvic- pertaining to the pelvis, usually the bony pelvis.

Perimortem- around the time of death.

Periodontal disease- disease of the supporting structures of the teeth, and the periodontium. The most common symptom is bleeding gums, but loosening of the teeth, receding gums and teeth, and necrotizing ulcerative gingivitis may be present as the disease process continues.

Periosteal layer- periosteum; a fibrous membrane which completely covers the surfaces of bones, except at points of tendinous and ligamentous attachment and on articular surfaces, where cartilage is substituted.

Periosteum- the fibrous membrane that forms the investing covering of bones except at their articular surfaces.

Periostitis- inflammation (reaction to trauma or certain pathological processes) of the periosteal layer of a bone.

Periostosis- abnormal bone formation on the periosteal surface of bone.

Plague- a word used to describe any widespread contagious disease associated with a high death rate.

Porosity- condition of having small openings that pass directly or indirectly through a structure.

Post bregmatic depression- a racial trait for African American. A depression in the cranium posterior to bregma.

Post cranial- all bones except the skull

Posterior- opposite of anterior; dorsal; directed toward or situated nearer the back surface of the body. Often used to indicate the position of one structure relative to another, e.g., the thoracic vertebrae are posterior to the sternum.

Posterior Bridge- bony spicules unite the posterior aspect of the superior articular facet of C1 with the posterior arch.

Postmortem- pertaining to or occurring during the period after the time of death.

Preauricular sulcus- a depression between the sciatic notch and sacroiliac articulation. It is most often found in females.

Premortem- pertaining to or occurring during the period before the time of death.

Prognathism- projection of the jaws beyond projection of the forehead. This is an African American trait.

Prosthetic- a replacement for decayed or missing body parts (e.g., dentures or artificial leg).

Prosthion- the most anterior point in the midline on the alveolar processes of the maxillae.

Provenience- The location of an artifact, feature, or excavation within a coordinate system. Usually given in two horizontal dimensions and one vertical dimension.

Proximal- opposite of distal; nearest to the trunk (main part of the body), or to the point of origin or attachment. Often used to refer to a structure that is nearer to the trunk than another, e.g. the forearm is proximal to the hand.

Pterygo Alar Bridge- a bony bridge due to fusion of the lateral lamina between the lateral pterygoid plait of the sphenoid and inferior surface of the greater wing.

Pterygo Alar Spur- an incomplete bony bridge due to fusion of the lateral lamina between the lateral pterygoid plait of the sphenoid and inferior surface of the greater wing.

Pterygo Spinous Bridge- a bony bridge due to fusion of lateral lamina between the lateral pterygoid plate of the sphenoid and spina angularis.

Pterygo Spinous Spur- an incomplete bony bridge due to fusion of lateral lamina between the lateral pterygoid plate of the sphenoid and spina angularis.

Pubic Symphysis- the medial surface of the pubic bone where the two innominates are joined together by fibro cartilage.

Radius- the radius is the lateral and shorter of the two bones of the forearm.

Radius Anterior-Posterior (Sagittal) Diameter at Midshaft- distance between anterior and posterior surfaces at midshaft.

Radius Maximum Length- distance from the most proximally positioned point on the head of radius to the tip of the styloid process without regard for the long axis of the bone.

Radius Medial-Lateral (Transverse Diameter at Midshaft)- distance between medial and lateral surfaces at midshaft.

Ramus- a branch; one of the divisions of a forked structure.

Reactive bone- bone in the process of being formed, lost, or otherwise modified in response to some stimulus, usually pathological.

Reinterment- Reburial of remains.

Remodeling- a cyclical process by which bone maintains a dynamic steady state through sequential resorption and formation of a small amount of bone at the same site. This process is often disrupted in pathological conditions affecting the bones, resulting in either abnormal bone loss or formation.

Resorption- the process of destruction of bone by osteoclasts.

Rickets- a deficiency condition in children that results in inadequate deposition of lime salts in developing cartilage and newly formed bone, causing abnormalities in shape and structure of bones.

Ridge- a crest; a raised linear projection or projecting structure.

Robusticity- degree of muscularity.

Rocker jaw- curvature of the inferior surface of the horizontal ramus of the mandible.

Sacral Base- the promontory of the sacrum.

Sacral hiatus- nonfusion of the fifth (or fourth and fifth) sacral unit.

Sacrum- the triangular bone situated dorsal and caudal from the two illium between the fifth lumbar vertebrae and the coccyx.

Sacrum Anterior Length- distance from a point on the promontory positioned in the midsagittal plane to a point on the anterior border of the tip of the sacrum measured in the midsagittal plane.

Sacrum Anterior Superior Breadth- maximum transverse breadth of the sacrum at the level of the anterior projection of the auricular surface.

Sacrum Maximum Transverse Diameter of Base- direct distance between the two most laterally projecting points on the sacral base measured perpendicular to the midsagittal plane.

Saggital Plane- a plane that divides the body into symmetrical right and left halves.

Saggital Sulcus- groove on inner surface of parietal bones, forming a channel for the superior sagittal sinus.

Sagittal Ossicle- small bone located within the sagittal suture.

Scapula- the large, flat, triangular bone that forms the posterior part of the shoulder. It articulates with the clavicle and the humerus.

Scapula Breadth- distance from the midpoint on the dorsal border of the Glenoid fossa to midway between the two ridges of the scapular spine on the vertebral border.

Scapula Height- direct distance from the most superior point of the cranial angle to the most inferior point on the caudal angle.

Scapular Spine- the long thin elevation on the dorsal surface of the scapula that ends laterally as the acromion process.

Schmorl's nodes- occurs as a result of intervertebral disk pressure on the superior or inferior surfaces of the vertebral bodies. Schmorl's nodes are commonly associated with other forms of degenerative change, such as the formation of bony spurs or osteophytes.

Scoliosis- lateral deviation (curvature) in the normally straight vertical line of the spine.

Septal Aperture- the olecranon foramen of the ulna-infrequent appearance, more common in females.

Sequestrum- fragment of a necrosed bone that has become separated from surrounding tissue. Designated primary if piece is entirely detached, secondary if still loosely attached, and tertiary if it is partially attached but still remaining in place.

Shoveling- referring to shovel shaped incisors. The inner surface of the crown of the maxillary incisors has concavity with a central fossa.

Skull- cranium and mandible together.

Smallpox- an acute, contagious, febrile disease, the constitutional symptoms of which are followed by the appearance of an eruption. That passes through the successive stages of macules, papules, vesicles, pustules, and crusts.

Soil profile- A vertical cross-section revealing the sequence of soil layers.

Sphenoid Bone- an irregular-shaped bone that helps form the floor and sides of the cranial vault. Composed of a body, two pairs of lateral expansions called greater and lesser wings, and a pair of processes that project downward (the pterygoid processes), it is in general a U-shaped bone. It articulates with the occipital, parietals, frontal, ethmoid, temporals, palatine, vomer, zygomatics and sometimes with the maxillae.

Spicule- a sharp, needle-like body or spike.

Spina Bifida Aperta (Cystica)- the most severe form of spina bifida. The nerve roots and/or the spinal cord may be extruded.

Spina Bifida- a birth defect in which the bones of the spine (vertebrae) do not form properly around the spinal cord. This can occur anywhere along the spine. Spina bifida is the most common of a group of birth defects called neural tube defects.

Spina Bifida Occulta- failure of vertebrae to close without hernial protrusion.

Spina ventosa- tuberculosis of the bone. The bone is expanding and the cortex thins.

Spiral fracture- an oblique fracture.

Squamous- the flat anterior and superior part of the temporal bone that articulates with the sphenoid and through a beveled suture with the parietal bones; it includes the zygomatics process..

Stellate fracture- a star-shaped fracture in which cracks radiate from the central point.

Stillbirth - A fetus carried to term and dead at birth.

Subpubic angle- the subpubic concavity. A lateral curvature a short distance inferior to the symphysis. It is wider in females and narrower in males.

Sulcus- any long, narrow groove, furrow, or slight depression.

Superior- opposite of inferior; situated above or directed upward. Often used to describe the position of one structure relative to another, e.g. the nose is superior to the mouth.

Supernumerary teeth- teeth exceeding the normal human number of deciduous (20) or permanent teeth (32).

Supra orbital margin- supra orbital border located on the upper edge of the eye orbit. A rounded margin suggests a male while a sharp margin suggests a female.

Supra orbital ridges- brow ridges or curved projections above the eye orbits. They are more pronounced in males.

Supraorbital Structures- notches and/or foramina may be present at the supraorbital margin of the frontal bone. All foramina must present openings on both orbital and external surfaces to be scored as present. Foramina on the superior, horizontal aspects of the margin are considered supraorbital; those located at the confluence of the vertical (medial) and horizontal aspects of the orbit are considered supratrochlear.

Survivorship curve- a demographic profile of a population using rates of survivorship.

Sustentaculum Tali- a process of the calcaneum that supports part of the astragalus.

Sutural Bones- a non-metric trait that consists of ossicles located at specific points in the cranial vault. They must be true separate ossifications and not part of a complicated suture. Adjacent sutures should be visible for them to be scored.

Suture- one of the interlocking lines of fusion of the separate bones which unite to form the cranium.

Symphysis- the region where two paired bones, such as the left and right pubis, join together.

Synovium- a synovial membrane.

TMJ- temporo-mandibular joint; the point of articulation between the condyle of the lower jaw (mandible) and the temporal bone.

Talus- the anklebone articulating with the tibia, fibula, calcaneous, and navicular bone.

Taphonomy- the study of the decomposition and disturbance of an organism or animal body by scavenging agents (microbes and other animals) and environmental forces.

Temporal bone- located at the side and base of the cranium, the temporal bone is below the parietal, posterior to the sphenoid, and anterior to the occipital. The organs for hearing and the articulation for the mandible are contained in this bone.

Tibia- the largest bone in the lower leg and, after the femur, the second largest bone in the skeleton. The tibia, or shin bone, is situated on the anterior (front) and medial (inside) side of the leg.

Tibia Circumference at Nutrient Foramen- circumference measured at the level of the nutrient foramen.

Tibia Length- distance from the superior articular surface of the of the lateral condyle to the tip of the medial malleolus.

Tibia Maximum Diameter at Nutrient Foramen- distance between the anterior crest and the posterior surface at the level of the nutrient foramen.

Tibia Maximum Distal Epiphyseal Breadth- maximum distance between the two most laterally projecting points on the medial malleolus and the lateral surface of the distal articular region (epiphysis)

Tibia Maximum Proximal Epiphyseal Breadth- maximum distance between the two most laterally projecting points on the medial and lateral surface of the distal articular region.

Tibia Medial Lateral Diameter at Nutrient Foramen- straight line distance of the medial margin from the interosseous crest at the level of the nutrient foramen.

Total station - A digital device to measure distances and angles utilizing laser and computer technology.

Transfer print- A form of ceramic decoration using an inked transfer medium to apply a design to unpainted plates or vessels prior to firing.

Transverse Foramina- natural openings into, or perforations through the transverse process of the cervical vertebrae.

Traumatic- pertaining to or caused by a wound or injury.

Treponema- a genus of spirochetes, parasitic in man, which belongs to the family Treponemataceae.

Trochlea- a structure having the function of a pulley; a ring or hook through which a tendon or muscle projects. Also the articular smooth surface of a bone upon which glides another bone.

Tuberculosis- an infectious disease caused by the tubercle bacillus, *mycobacterium tuberculosis,* and characterized pathologically by inflammatory infiltrations, formation of tubercles, necrosis, abscesses, fibrosis, and calcification. It most commonly affects the respiratory system, but other parts of the body, such as gastrointestinal and genitourinary tract, bones, joints, nervous system, lymph nodes, and skin, may become infected.

Tympanic Dehiscence- incomplete closure of tympanic plate of the temporal bone. The defect occurs on the anterior aspect, posterior to the mandibular fossa.

Tympanic Plate- a bony plate that that grows between one and five years of age and extends posteriorly and inferiorly to enclose the base of the styloid process and eventually fuses with the petrous base of the temporal bone.

Ulna- a long bone on the medial side of the forearm, articulating at the proximal end (elbow) with the humerus and laterally with the radius. Distally, it articulates with the radius but connects only directly with the carpus (wrist).

Ulna Anterior-Posterior (Dorso-Volar) Diameter- maximum diameter of the diaphysis at the level of greatest crest development in anterior-posterior (dorso-volar) plane.

Ulna Maximum Length- distance from the most superior point on the olecranon to the most inferior point on the styloid process.

Ulna Medial-Lateral (Transverse) Diameter- distance between medial and lateral surfaces at the level of greatest crest development.

Ulna Minimum Circumference- least circumference near the distal end of the bone.

Ulna Physiological Length- distance between the most distal (inferior) point on the surface of the coronoid process and the most distal point on the inferior surface of the distal head of the ulna.

Upper Facial Breadth- the direct distance between two external points on the Frontomalar suture.

Upper Facial Height- the direct distance from Nasion to prosthion.

Variola major- an acute, contagious, systemic, viral disease characterized by constitutional symptoms usually are severe, followed by an eruption that passes through the successive stages of macules, papules, vesicles, pustules, and crusts.

Variola minor- mild form of smallpox with sparse rash and low-grade fever.

Vascular- pertaining to or composed of blood vessels.

Vertebrae- any one of 33 bony segments of the spinal column. The spinal vertebrae contain 7 cervical, 12 thoracic (dorsal), 5 lumbar, 5 sacral, and 4 coccygeal vertebrae.

Vertebral Body- the centrum or corpus that is composed of compact bone over a cylinder of cancellous bone that transmits weight to the vertebrae below.

Wetlands- A low-lying ecosystem in which the water table is at or near the ground surface. May be associated with marine or freshwater environments.

Wormian bone- sutural bone; a small, irregularly shaped accessory bone (ossicle) that forms in one of the sutures between adjacent cranial bones.

Zygomatic Arch- formed by the articulation of the zygomatic process of the temporal bone and the zygomatic bone.

Zygomatic Bone- this bone forms the prominence of the cheek and can be felt under the skin just below and lateral to the eye socket.

Zygomatic maxillary suture- the suture between the zygomatic and maxilla bones.

Zygomatic Process- located on the external surface of the temporal bone, it is a portion of the bone extending forward and articulating with the malar bone to form the zygomatic arch.