ARCHEOLOGICAL INVENTORY AND EVALUATION

CityArchRiver 2015 West Entrance Project
Jefferson National Expansion Memorial
St. Louis, Missouri

FINAL REPORT

PREPARED FOR:

NATIONAL PARK SERVICE
DENVER SERVICE CENTER
12795 West Alameda Parkway
Denver, CO 80225

PREPARED BY:

THE LOUIS BERGER GROUP, INC.
1250 23rd Street, NW.
Washington, D.C. 20037-1164

February 2013

ARCHEOLOGICAL INVENTORY AND EVALUATION

CityArchRiver 2015 West Entrance Project
Jefferson National Expansion Memorial
St. Louis, Missouri

Final Report

CONTRACT NO. C2000091500
TASK ORDER NO. P12PD12846

Prepared For:

NATIONAL PARK SERVICE
DENVER SERVICE CENTER
12795 West Alameda Parkway
Denver, Colorado 80225

Prepared By:

Charles LeeDecker, Delland Gould, and Christopher Schoen
THE LOUIS BERGER GROUP, INC.
1250 23rd Street, NW
Washington, D.C. 20037-1164

February 2013

ABSTRACT

The National Park Service-Denver Service Center sponsored a program of geoarcheological testing for the CityArchRiver 2015 (CAR2015) West Entrance Project, which is located within the Jefferson National Expansion Memorial (JEFF) in the downtown riverfront area of St. Louis, Missouri. The geoarcheological inventory and investigation completed by The Louis Berger Group, Inc., was designed to support an assessment of the potential effects of the CAR2015 West Entrance Project on archeological resources. The goal of this inventory and evaluation was to assess whether or not the project area of potential effect (APE) has the potential to contain significant archeological resources. The investigation consisted of archival research and fieldwork.

Plans proposed for the new West Entrance project include grading, landscaping, and constructing a pedestrian-friendly green space bridge over Interstate-70 to improve circulation to the JEFF grounds. These plans also include building a subterranean museum addition to connect to the west end of the current museum space with an exterior entryway near the western edge of the Gateway Arch grounds. The APE for the CAR2015 West Entrance Project geoarcheological investigation covers the estimated area potentially affected by the planned undertakings, including both direct and indirect effects, such as construction traffic and staging. The APE encompasses an area of approximately 6 acres that includes the Luther Ely Smith Square (Block 85) and a larger area east of I-70 that is located north of the Old Cathedral. For the purposes of this investigation, the area east of I-70 is referred to as Sub Area 1, and Luther Ely Smith Square is referred to as Sub Area 2. Sub Area 3 refers to additional areas of the park that were judgmentally tested to gain additional information about the park's archeological record.

In all, 36 cores were extracted with a small, track-mounted Geoprobe®. The cores were placed at locations where the historical map research suggested the possibility for preservation of prehistoric or early historic landscapes. These areas were assumed to coincide with historically open streets, alleys, or backlot areas where the potential archeological deposits were expected to be minimally disturbed by building construction and demolition. The intent was to determine whether deposits remained that were associated with the earliest history of St Louis and/or prehistoric occupation of the area.

As expected, the upper deposits in the soil columns were dominated by anthropogenic deposits (fills) that reflect the mid-twentieth-century reshaping of an urban landscape that developed in the nineteenth century. The cores were advanced to an average depth of 26.5 feet below ground surface (bgs). The average depth of fill was 16.2 feet bgs. Analysis of the cores indicates that in general the native A-horizon, which was the occupation surface for prehistoric groups, historic Native American tribes, and early historic settlers in the APE, has been completely removed. Only Pleistocene-era deposits were evident under fill in the cores. These subsoil deposits include strata deposited after the glaciers retreated from the area some 12,000 years ago, and include sediments provisionally identified as loess, glaciofluvial, and glaciolacustrine deposits.

Regarding the archeological potential, the presence of intact Bt-horizon soils in Sub Area 2 (Block 85) suggests that the upper portion of the pre-development soil profile is preserved, at least in one portion of the square. Any former surface or near-surface archeological deposits will be absent, but there is a potential for the lower portions of deep (greater than 5 feet) shaft features dating to the early historic period to be preserved. In Sub Area 1 and Sub Area 3, the potential to encounter intact archeological deposits appears to be very low.

TABLE OF CONTENTS

Section	*Page*
ABSTRACT	i
LIST OF FIGURES	iii
LIST OF TABLES	iii
I. INTRODUCTION	1
II. ENVIRONMENTAL SETTING	4
A. Natural Environment	4
B. Modern Urban Environment	6
III. RESEARCH DESIGN	8
A. Research Objectives	8
B. Methodology	8
1. Archival Research	8
2. Field Investigation	9
IV. BACKGROUND RESEARCH	13
A. Previous Investigations	13
B. Regional Prehistory	17
C. Historic Context	20
1. Exploration and Contact (circa 1673 to 1764)	20
2. The French Village (1764 to 1819)	21
3. The Walking City (1820 to1869)	26
4. The Victorian City and Street Car (1870 to 1900)	34
5. The World's Fair City and the Automobile (1904 to 1940)	36
6. Creation of a National Monument	44
V. RESULTS OF GEOARCHEOLOGICAL TESTING	50
A. Sub Area 1	50
B. Sub Area 2	50
C. Sub Area 3	52
D. Summary and Interpretation of Stratigraphy	52
VI. ASSESSMENT OF ARCHEOLOGICAL RESOURCE POTENTIAL	60
VII. CONCLUSION	64
REFERENCES CITED	65
APPENDICES	
A Coring Descriptions	A-1
B Qualifications of Investigators	B-1

LIST OF FIGURES

Figure		*Page*
1	Location of Jefferson National Expansion Memorial	2
2	Area of Potential Effects, CityArchRiver 2015 West Entrance Project	3
3	Geoprobe Drill	10
4	Example of a Soil Core	12
5	Base Map of City Blocks	22
6	Village of St. Louis, ca. 1804-05	24
7	Areas Destroyed by 1849 Fire	29
8	Ruins of the Great St. Louis Fire, 17-18 May 1849 (Thomas M. Easterly daguerreotype).	30
9	Detail of *Our City (St. Louis, Mo.)*	32
10	Detail of *The Bridge at St. Louis*, ca. 1874, Showing St. Louis Riverfront Area	35
11	Study Area in 1870	37
12	Detail of *The City of St. Louis, as Seen from above the Mississippi River*	38
13	Study Area in 1876	39
14	Detail of *Pictorial St. Louis, The Great Metropolis of the Mississippi Valley, A Topographical Survey Drawn in Perspective*	40
15	Study Area in 1897	41
16	Study Area in 1907	42
17	Study Area in 1932	43
18	View Along Riverfront, 1930s	45
19	Site Conditions After Land Clearance, ca. 1942	45
20	Site Conditions, 1948	46
21	Site Conditions, 1957	47
22	Site Conditions, 1962	49
23	Location of Cores	51
24	Reconstructed East-West Stratigraphic Profile	56
25	Reconstructed North-South Stratigraphic Profile	57
26	View from Luther Ely Smith Square, ca. 1935-1940	63
27	Site Conditions During Construction, 1962	63

LIST OF TABLES

Table		*Page*
1	Correlation of Unconsolidated Geologic Map Units in the Vicinity of the Study Area	5
2	Summary of Features, Parking Garage Monitoring	15
3	Alternate Street Names	23
4	Structures Built from 1804 to 1821 in the Study Area	27
5	Businesses, Professions, Tradesmen, and Industries in St. Louis, 1821	28
6	Summary of Coring Results	53

I. INTRODUCTION

The National Park Service (NPS) is evaluating possible impacts to archeological resources associated with the CityArchRiver 2015 (CAR2015) West Entrance Project, which is located within the Jefferson National Expansion Memorial (JEFF). JEFF is located in the downtown riverfront area of St. Louis, Missouri, on the west bank of the Mississippi River (Figure 1). The 91-acre park property encompasses an area of 38 blocks, extending along the riverfront for a distance of approximately 3,600 feet. The northern park boundary is marked by Eads Bridge or Washington Avenue, and the southern boundary is at Poplar Street. From east to west, the park extends from Leonor K. Sullivan Boulevard by the river levee to Memorial Drive and Interstate-70 (I-70) (aka the Third Street expressway), which follows the historical alignment of Third Street. West of I-70, the park includes two blocks between Market and Chestnut streets, thereby forming an inverted T-shape. The westernmost block, bounded by Fourth Street and Broadway (Block 102[1]), includes the Old Courthouse, and the block between Third and Fourth Streets (Block 85) encompasses Luther Ely Smith Square.

The area of potential effect (APE) for the CAR2015 West Entrance Project encompasses an area of approximately 6 acres that includes the Luther Ely Smith Square, an area measuring about 235 feet (72 meters) north-south by 328 feet (100 meters) east-west in Block 85, plus an area about 525 feet (160 meters) north-south beginning north of the Old Cathedral and extending from I-70 approximately 394 feet (120 meters) east (Figure 2). Plans proposed for the new West Entrance area include grading, landscaping, and constructing a pedestrian-friendly green space bridge over I-70 to improve circulation to the JEFF grounds. These plans also include building a subterranean museum addition to connect to the west end of the current museum space with an exterior entryway near the JEFF grounds' western edge. The APE outlined on Figure 2 estimates the area potentially affected by such undertakings, including both direct and indirect effects, such as construction traffic and staging.

The goal of this archeological inventory and evaluation, carried out by The Louis Berger Group, Inc. (LBG), for NPS, is to assess whether or not the project APE has the potential to contain significant archeological resources. Fieldwork for this investigation was completed November 5-9, 2012.

[1] In St. Louis city blocks have been assigned individual numbers, and these numbers are used as a convenient spatial reference in this report. With the creation of JEFF, historical blocks 2 to13, 28 to 39, and 54 to 65 were combined into one property, which is presently designated as Block 59.

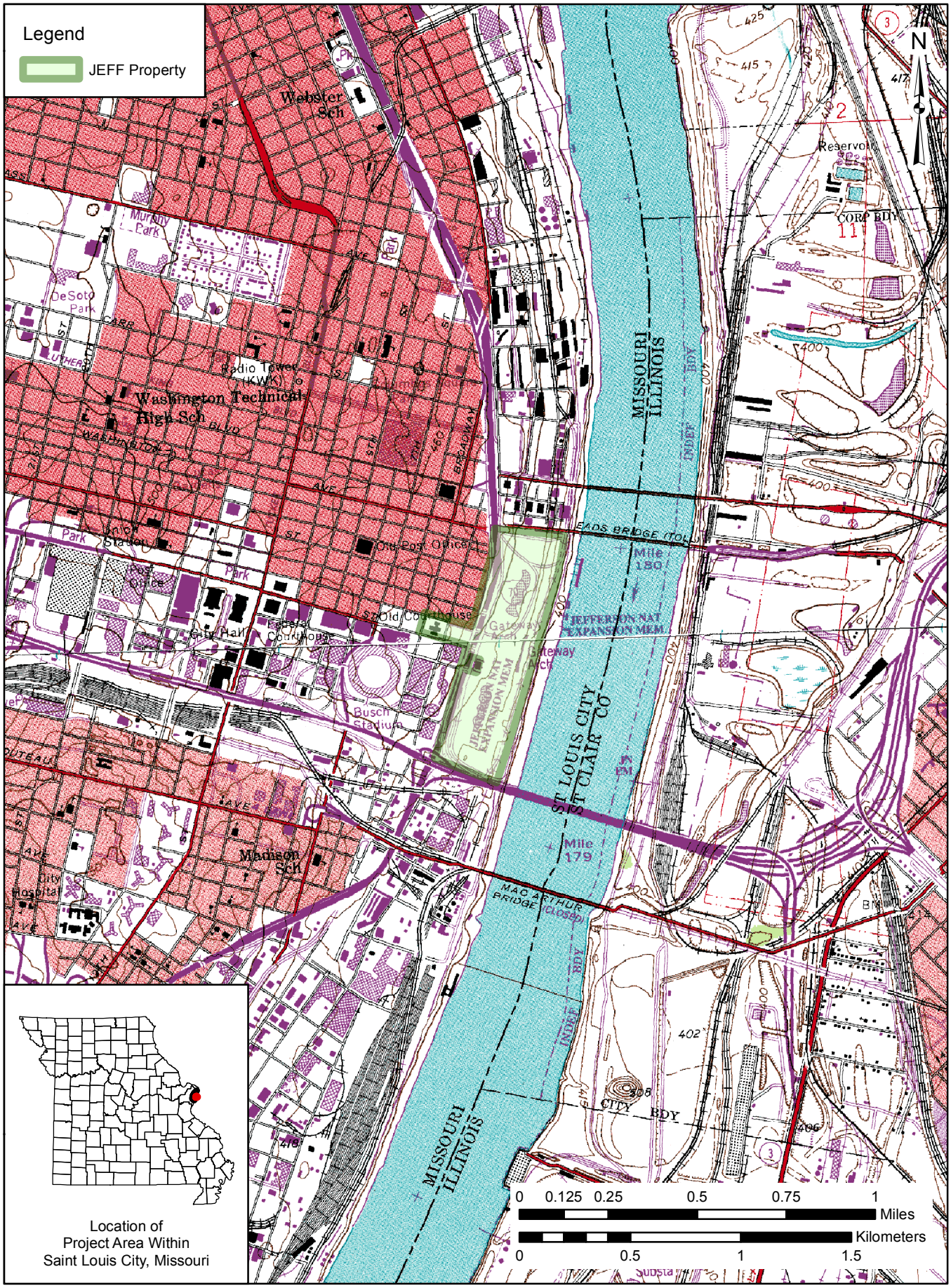


FIGURE 1: Location of Jefferson National Expansion Memorial

SOURCE: USGS 1954a, 1954b

FIGURE 2: Area of Potential Effects, CityArchRiver 2015 West Entrance Project

SOURCE: NPS 2009

II. ENVIRONMENTAL SETTING

A. NATURAL ENVIRONMENT

The APE is located along the developed shoreline of the Mississippi River approximately 20 kilometers (12 miles) south of its confluence with the Missouri River, in downtown St. Louis, Missouri. The city of St. Louis lies near the southern limit of the Dissected Till Plains Physiographic Province where it meets the Ozark Plateau. The St Louis and the surrounding area is marginal to at least two major glaciations in the Pleistocene, but remained south of the glacial front during the Last Glacial Maximum (LGM) approximately between 26,500 and 19,000 years ago (Clark et al. 2009; Pearce and Baldwin 2005).

Bedrock underlying St. Louis is the Paleozoic Ste. Genevieve and St. Louis limestones of the Mississippian Meramec Series. This bedrock supports the steeply defined bluffs that differentiate the bedrock plateau from the valley floor. The Ste. Genevieve limestone has a conglomeritic base and unconformably overlies the St. Louis Limestone, and is mapped as directly underlying the project area (Harrison 1997). Despite its proximity to the Mississippi River, the bedrock-defended meander upon which the city center rests is upland and lacks the several meters of variable silts, clays, and coarser alluvial deposits that characterize the bottomlands to the north and south. The APE sits atop a bedrock promontory that extends all the way to the current channel of the river, and the site is subject to flooding only during the very highest flows. As a low-elevation extension of the bedrock bluffs, the downtown area of St. Louis has a complex and extensively modified surficial geology. Unconsolidated deposits in the APE vicinity overlying the bedrock are derived from till, loess, and glacial outwash, all of which have been modified by over 200 years of historical development. Surficial deposits in the APE are mapped as Artificial Fill (AF), denoting the extensive cut-and-fill that has occurred (Kaden and Starbuck 2008).

Although surficial geological mapping is available for both sides of the Mississippi River, the geologic units mapped in the two states have differing terminologies and descriptions. Geologic units of interest for the current project are correlated in Table 1. The primary reason to incorporate geologic terminology from the Illinois side of the river is that the geology is equivalent, but the mapping units designated by the ISGS (Grimley and Phillips 2011; Phillips et al. 2001) are mapped at a finer scale, are described in more detail, and are assigned to broad chronological periods or geomorphic episodes that can aid interpretation of the geological sequence in the APE.

The uplands bluffs of the area are mantled with the silts of the Peoria and/or Roxanna Loess, generally thickest (up to 13 meters [40 feet]) along the bluffs and thinning with distance from the river (Pearce and Baldwin 2005). The edge of the bluffs demarcates the glacial uplands from the infilled paleochannel/Holocene meander belt of the Mississippi River. The valley bottoms have been scoured by glacial meltwater flows and were subsequently infilled with coarse sediments derived from late glacial outwash of the Henry formation (Qh). The Henry formation is overlain by alluvium of the Cahokia formation within the Holocene meander belt of the river. Cahokia formation (Qc) deposits range from sandy point and channel bar alluvium (Qcs) to clayey alluvium in abandoned channels and backswamps (Qcc). (Kaden and Starbuck 2008; Pearce and Baldwin 2005).

Prior subsurface investigations in the park, including archeological and geotechnical work conducted for the installation of an underground parking garage, indicate the depth of bedrock at between 125 and 133 meters above mean sea level (amsl) (Wells and Williams 1985:28). For the most part building rubble and fill extend down to the top of bedrock, the result of the near-complete development of the APE in the nineteenth and twentieth centuries. Where building rubble and fill did not extend to the upper contact of bedrock, intact soil was described as a yellowish brown clayey silt loam with accumulations of iron and manganese. In one location this sterile subsoil was capped by a thin dark brown silt that likely represents the historic to precontact A-horizon. The description of the lower soil unit suggests that the intact material correlates to one of two lithostratigraphic units: weathered Peoria/Roxanna loess or late Pleistocene/earliest Holocene low-energy alluvium possibly correlates to the Cahokia or Equality Formations (Qce). The most likely possibility is that the sediments are weathered loess, as the landform is an upland.

TABLE 1

CORRELATION OF UNCONSOLIDATED GEOLOGIC MAP UNITS
IN THE VICINITY OF THE STUDY AREA

MATERIAL	DESCRIPTION	ISGS SYMBOL, NAME	MODNR SYMBOL	AGE
Artificial Fill	Disturbed soils/sediments	AF	AF	Modern/Recent
Clayey alluvium	Low energy alluvium, backswamp and slackwater channel facies	Qcc Cahokia Formation, Clayey	Qcly	Holocene
Sandy alluvium	Higher energy alluvium, bar facies, terraces	Qcs Cahokia Formation, Sandy	Qcly	Holocene
Fine-grained silts	Low energy lacustrine or slackwater alluvial deposits	Qce Cahokia or Equality Formation	Qcly(?)	Pleistocene to Holocene
Lacustrine Terrace	Low-energy deposition (silt, clay) in glacial lake(s)	Qe Equality Formation	_	Pleistocene
Outwash Terrace	Deposition at margins of high energy meltwater flows (sand/gravel)	Qh, Henry Formation`	Qter	Pleistocene
Loess	Windblown material (silt) accumulating on uplands	Qpr, Peoria/Roxanna Silt	Ql, Qlt	Pleistocene

The Pleistocene and Holocene history of the landform, based on available data, begins with glaciation during Illinoian or pre-Illinoian time (before 125,000 years ago), when glacial ice scraped away any unconsolidated material that was present and left in its wake deposits of till that are present throughout the area. During the last glacial advance (Wisconsinan), the ice front did not reach as far south as the project area. The ancestral Mississippi River would have been swollen with sediment-choked meltwater at times. The sediments left behind created the coarse sand and gravel deposits preserved as outwash terraces along the valley margins, and the silts were mobilized by wind and blown up out of the floodplains and onto the surrounding uplands. The thick loess blanket stabilized, and for the most part, deposition in the APE vicinity ceased. The surrounding bottomlands preserve evidence of clays deposited when ice-damming transformed the river into a lake, which were in turn capped by variably textured alluvial deposits across the floodplain. Although changes in vegetation occurred, the immediate

landscape of the project area would have looked much the same to the first humans who arrived in the region over 12,000 years ago as it did to the first European colonists who established the frontier settlement of St. Louis.

Any prehistoric archeological sites in the loess-capped upland would be confined to the uppermost portion of any preserved soil column where the original pre-contact A-horizon is preserved. However, sites dating to the Archaic period and earlier have been found shallowly buried in Pleistocene loess, most likely because of the action of soil-dwelling invertebrates (Van Nest 2002). Although the dynamics of the burial model are the subject of debate, the occurrence of pre-Woodland artifact scatters in sub-plowzone contexts is widespread in loess-mantled landscapes of the midcontinent. Although the lower limit to the depth of burial has not been defined, site deposits would generally be found within 60 centimeters or less of the original soil surface (Van Nest 2002:68-9).

In summary, the project area occupies an upland landform founded on a sloping bedrock surface and capped by silty to silty clay sediments that were likely deposited as loess during the late Pleistocene, approximately 12,000 years ago. Additions to the soil profile by lacustrine or alluvial processes do not appear to be substantial, and all prehistoric artifacts or sites would be expected to be found within less than a meter of the original soil surface, if it remains intact anywhere within the APE. Historic-period archeological deposits may be found at any depth above bedrock, although most of these would be the result of the construction and demolition of buildings during the nineteenth and twentieth centuries and would be uninformative. Early historic features would likely be found in the same areas, where the original ground surface is preserved, although shaft-type features, such as privies or wells, likely extend to a depth of 1 to 3 meters below the original surface.

B. Modern Urban Environment

The park today is a modern urban landscape that bears little resemblance to the natural environmental conditions that existed prior to the historical development of the St. Louis riverfront.

The dominant feature of the park is the Gateway Arch, which stands at a height of 630 feet and dominates the urban skyline of downtown St. Louis. The stainless steel structure occupies a landscape that is carefully designed to enhance views of the arch and of the river while obscuring various functional and utilitarian elements of infrastructure. The main portion of the park stretches along the riverfront and is bounded on the west by Memorial Drive and I-70, which is set in a subgrade cut that follows the historical alignment of Third Street.

West of I-70, the park includes two blocks that form an alignment with the Gateway Arch. The westernmost block — bounded by Fourth, Fifth, Market, and Chestnut streets — is occupied by the Old Courthouse, a domed structure that was the tallest building in St. Louis for much of the late nineteenth century. The Old Courthouse is maintained as a historic property and is historically significant primarily as the venue for the Dred Scott case that was ultimately decided by the Supreme Court in 1857. Situated between the Old Courthouse and I-70, Luther Ely Smith Square occupies the entire block bounded by Third, Fourth, Market, and Chestnut streets. In this

block is a sunken area or shallow trench that stands 3 to 5 feet lower than the surrounding grade and is aligned on the east-west axis.

East of I-70, creation of the landscape for the Gateway Memorial involved the use of massive quantities of fill material to sculpt the topography in a way that enhances views of the river, the arch, and the Old Courthouse. The Old Cathedral is the only historic structure that was preserved within the main portion of the memorial grounds. The church and its immediately surrounding grounds are owned by the Catholic Church, but the parking lot is on NPS land. As a historic survival within the formally landscaped grounds, the Old Cathedral preserves the only visually prominent significant element of the cultural landscape that existed prior to development of the park. The memorial grounds contain an active railroad line that is hidden from view by a series tunnels and deep cuts flanked by retaining walls. Other below-grade infrastructure that is largely hidden from view includes the visitor center, the parking garage, and the maintenance facility. To the north and south of the site's primary axis are two ponds that were created in shallow depressions. Other amenities throughout the park include pathways, scenic overlooks, and the Grand Staircase.

III. RESEARCH DESIGN

A. RESEARCH OBJECTIVES

The goal of this investigation is to assess whether or not the project APE has the potential to contain significant archeological resources. For purposes of this investigation, a more broadly defined study area — generally corresponding to the JEFF park property — has been investigated to provide a general historic context. Urban areas present a unique set of opportunities and constraints for archeological resource management, of which the most important are (1) the large amount of documentary information that is available, (2) the often complex land-use histories for individual sites or project areas, and (3) the logistical constraints to fieldwork posed by various factors, such as competing land uses, active utility lines, pavement, fill deposits, and soil contamination. The large amount of documentary information frequently allows preparation of detailed land-use histories and specific predictions regarding the types and locations of archeological resources, and it is often possible to develop very detailed contextual statements for individual sites or project areas prior to actual archeological fieldwork. However, complex land-use patterns are often manifested in the archeological record, and it is not uncommon to find that evidence of prehistoric and early historic occupations has been obliterated by more recent land-use activities.

The principal cultural resource management objective of this study is to evaluate the archeological potential or sensitivity of the APE. To meet this objective, research focused on the following specific goals:

- description of the urban growth processes that have characterized the site;
- identification of the range of historical land use patterns and occupations associated with the site;
- evaluation of past construction or landscape-altering activities that may have disturbed or destroyed archeological resources within the site.

B. METHODOLOGY

1. Archival Research

There has been relatively little archeological work within JEFF, a fact that seems to reflect the general logistical constraints of urban archeology and the assumption that modern urban development would have obliterated archeological resources associated with the prehistoric or early historic occupation of the study area. No archeological resources have been formally recorded within JEFF, and the only formally reported archeological investigation is a construction monitoring program for a parking garage (Wells and Williams 1985). Some salvage excavations were completed in 1960 during park development (Bradley 1960, 1976), but formal reports of this work have not been found.

Although few archeological studies have been conducted, there are other sources of important information regarding the physical history of this area, which is essential for understanding the archeological record. Perhaps the most important sources for understanding the physical history of the site are two Cultural Landscape Reports (CLRs) for JEFF (AECOM 2010; Bellavia 1996). Although the CLRs provide very little information about the physical character of the site prior its development as a national park, they do provide a wealth of detail concerning the physical transformation of the pre-existing landscape into its present form. Likewise, the National Register nomination (Ortega 1976), which is now quite dated, focuses on the twentieth-century development of the park according to the Saarinen plan.

Archival research for this study was conducted at the JEFF archives, the Missouri State Historic Preservation Office (SHPO) archives, and various on-line sources. As part of the background research, digital copies of maps were collected and assembled for the study and put into a Geographic Information System (GIS) project file. Other geographic datasets that were incorporated into the GIS include aerial imagery, topographic contours, and information about existing utilities.

Aside from maps, there is a rich record of visual material that provides an invaluable record for understanding the historical development of the cultural landscape. The riverfront area of St. Louis, including the Eads Bridge, was a particularly popular subject in historical views of St. Louis. Oblique aerial views, facing toward the west, appeared in the mid- to late nineteenth century. Postcard scenes of Eads Bridge and the adjacent levee document the early twentieth-century scene that later became JEFF. The Historic American Engineering Record (HAER) documentation of Eads Bridge (Murphy 1984), along with material in the Library of Congress Prints and Photographs Division, also provides an important visual record of the study area during the late nineteenth and early twentieth centuries.

2. Field Investigation

After gaining familiarity with the historical development of the APE through documentary research and preparation of GIS coverages, a series of sampling locations was selected for field testing. The sampling locations were digitized as a shape file so that it became a simple matter to navigate via GPS to the sampling locations in the field. Utility maps were reviewed prior to establishing the testing pattern, and a formal utility markout was requested through the Missouri One Call system. Final adjustments to the sampling locations were made in the field in consideration of local conditions, such as unmarked storm drains and slope.

The geoarcheological coring fieldwork was performed by Christopher Schoen and Delland Gould from November 5 to 9, 2012. The hollow tube cores were extracted by LBG's subcontractor, Roberts Environmental Drilling, Inc. In all, 36 cores were extracted with a small, track-mounted Geoprobe® (Figure 3): 20 cores from Subarea 1, seven cores from Subarea 2 (Luther Ely Smith Square), and nine cores from Subarea 3. The cores were placed at locations where the map research suggested the possibility for preservation of prehistoric or early historic landscapes. These areas were assumed to coincide with historically open streets, alleys, or backlot areas where the potential archeological deposits were expected to be minimally disturbed by building construction and demolition. The intent was to determine whether deposits remained

FIGURE 3: Geoprobe Drill

that were associated with the earliest history of St Louis and/or prehistoric occupation of the area. It should be noted that the placement of cores was based on GIS projections from historical mapping of uncertain accuracy. The historical streets were on the order of 60 feet wide and the alleys were typically at least 15 feet wide. Areas of this size were expected to be easily located with modern GPS equipment, even in a modern landscape that bears no trace of the original street grid.

Each core measured 2 inches (5 centimeters) in diameter and was encased in clear plastic collection tubes during extraction. Each lining tube was 48 inches (122 centimeters) long. The lining tubes were placed in a metal case that was driven into the ground by the Geoprobe®. When the core case was driven 48 inches into the ground, the core was extracted, a new lining tube inserted, and the core advanced another 48 inches. In most cases cores were driven into the ground until bedrock, dense rubble or concrete, or dense clay refused further advancement. In some instances drilling ceased when sufficient information had been collected about the geomorphological character of the location.

After extraction, core segments were laid out on a table, and one-third to one-half of the plastic tubing was removed to expose the core sample. The sample was sliced lengthwise to show more clearly the character of the deposits (Figure 4). Voids and/or compaction of deposits often resulted in core samples appearing to be less than 48 inches long. A photograph was taken of each core. Schematic soil profiles were generated from soil samples, with soil descriptions based on Munsell soil color terminology and USDA soil textural classes. Additional characteristics recorded and used to assign soil horizon designations were consistency, structure, accumulations/depletions (e.g., oxidation or reduction of iron), mottling, boundary characteristics, and continuity.

Another characteristic of each core section recorded was recovery, a sampling error representing the length or amount of the sample in each 4-foot core section. Particularly in unconsolidated fills, recovery can be less than 50 percent (2 feet of sample in a 4-foot core) or even none at all. Zero or no recovery typically occurs when coring through poorly compacted deposits of resistant material (rock, brick, or concrete), where the sampling tube collects only material that is small enough to enter the tube, and materials too large to enter are pushed aside where compressible void space exists. No recovery can also occur in saturated, unconsolidated sands; in that case the material is collected in the tube, but when the tube is extracted, the material behaves as a liquid and “pours” out the bottom. Generally, some compression of sediments always occurs, except in resistant materials, and results in some minor errors in the estimations of absolute depth below surface for some stratigraphic units or horizon boundaries. Nonetheless, each core section still represents 4 feet in absolute depth, and therefore these sampling errors are not compounded through the length of the core.

FIGURE 4: Example of a Soil Core

IV. BACKGROUND RESEARCH

A. PREVIOUS INVESTIGATIONS

The NPS Archeological Sites Management Information System (ASMIS) does not contain any site records for the JEFF property, nor are there any previously recorded sites in the Missouri SHPO files, although there has been some previous archeological work in the park and a number of sites have been identified in the surrounding area.

Missouri SHPO files indicate that six archeological sites have been identified within 1 mile of the project area at JEFF, and 12 previous investigations were done within 1 mile of the project area. Site 23SL3 is Big Mound (Peale's Mound 27), a Middle Mississippian earthwork that was situated at the corner of Broadway and Mound streets. Site 23SL4 is the location of a group of 25 mounds arranged around a central square located south and east of Broadway and Mound streets recorded by Thomas Say and Titian Peale in 1861. Site 23SL976 is situated between North Ninth and Eleventh streets and Walnut and Clark streets and includes building foundations, a well, cisterns, and latrine pits associated with residences and businesses from about 1836 to at least 1950 (Naglich and Harl 1995). Site 23SL2234 (MoDOTST6) includes one extant structure (Eugene Field House) and the remains of a series of row houses dating to between 1845 and 1935 located east of Broadway and north of Cerre Street. Site 23SL2309 is located between North Eleventh and Twelfth streets and O'Fallon and Cass streets and includes historic features associated with residential and commercial development of the area beginning in the 1840s (McLaughlin et al. 2009). Site 23SL2324 is the location of seven historic graves believed to be associated with the Rutgers Cemetery east of Seventh Street and north of Park Avenue.

Shortly after development of the 1959 Master Plan for the Jefferson National Expansion Memorial (JNEM as it was then known), NPS established an archeological program at JEFF, headed by Zorro Bradley. Bradley's work included a search for Gen. William Clark's residence, which was constructed in Block 12 in 1818, and stone structures in Block 9 that were used as stores and storage from about 1818 to 1825; the search for the 1835 American Fur Company Warehouse in Block 13; discussion of the foundation remains of a structure (possibly the 1802 bakehouse) on the Joseph Robidoux III property in Block 6; excavation around the footing of the 1841 Glasgow-Howard Building; and excavation in the basement of the Horace E. Dimick gun shop in the 1849 four-story brick Papin Building at 42 North Main Street in Block 32 (Bradley 1960). In 1940 Henry E. Rice, Jr. completed investigations of the "Old Rock House," which was the warehouse constructed by Manuel Lisa in 1818, torn down and reconstructed in 1941, and demolished in 1959[2].

Available records of Bradley's work are contained in a series of internal NPS memoranda that outline the status and progress of what was initially anticipated to be a fairly ambitious program of archeological salvage. The program was guided by studies completed by the Architectural

[2] This study is mentioned in Zorro Bradley's 1960 memorandum regarding the archeological program at JNEM, but a copy of the report has not been located.

Research Unit, which identified some 80 sites that were considered worthy of interest, of which 54 were of sufficient importance to plot on a historical base map in 1943. By that time land condemnation and building demolition had cleared most of the park property, and by 1960 much of the site work had been completed, including extensive grading and filling. Referencing a set of historical base maps that accompanied the park's 1959 Master Plan, Bradley noted that a number of historical sites had been destroyed by highway construction along Third Street and by the realignment of the railroad. Bradley mentioned that extensive test excavations had yielded only disappointing results. An important observation was that a fill deposit ranging in thickness from 10 to more than 30 feet had been placed in an area east of Second Street, covering 35 of the sites that were of historical or archeological interest, mostly sites that had been established in the late eighteenth century and the first decades of the nineteenth century. The deep fill deposits over much of the site presented costs that were considered prohibitively expensive for archeological investigation, even with mechanical equipment.[3] Bradley's 1960 status report concludes with a recommendation for additional work in the Arch-Visitor Center, which was expected to begin in 1961. The strongest recommendation for future work was in the vicinity of the Old Cathedral, particularly the area to the east where important — but unspecified — historical remains could likely be recovered. This area was not directly threatened with development, so the work there would be guided by a research agenda (Bradley 1960). A subsequent memorandum, written more 15 years after the program apparently ended, refers to a realignment of the program when it became apparent that the structures that were sought for documentation had either been destroyed or too deeply buried to warrant excavation. This memo refers to two short reports on the foundation remnants of the Roubidoux structure and the Dimick gun shop (Bradley 1976). Neither report was available at the JEFF archives.

Construction of a new parking garage at the north end of the JEFF property was monitored by archeologists from Southern Illinois University at Edwardsville (Wells and Williams 1985). The study was conducted under the premise that only intact resources dating prior to 1849 would be considered significant, and no archeological features or deposits of that period were identified. The parking garage included portions of Blocks 13, 28, and 65, encompassing an area of slightly more than 5 acres. Archival research determined that the study area historically contained settlement dating to the earliest years of St. Louis, including two structures that appeared on a plat of 1770. These included a wooden post structure on Block 28 and a stone structure on Block 13. Block 28, sometimes known as the Cerre Block, was particularly interesting as it was the site of a large stone house built by James Clamorgan that later became the residence of Major Pierre Chouteau, Sr., and another house built in 1829 that was built by Pierre ("Cadet") Chouteau, Jr. As the riverfront developed in the nineteenth century, the residential structures were replaced by larger commercial structures, such as warehouses. The study also reviewed the results of geotechnical borings that had been completed prior to construction, noting that seven of the nine borings indicated massive rubble fills directly over bedrock; however, two of the borings showed natural soils approximately 8 feet thick over bedrock.

[3] Bradley clearly appreciated the logistical challenges of urban archeological excavation, as evidenced by his proposed budget for salvage excavation in the Arch-Visitor Center; his budget for heavy equipment (a bulldozer, a front end loader, and a backhoe) exceeded the amount estimated for labor.

The monitoring program for the parking garage was documented by the preparation of three stratigraphic profiles, recordation of six features, and cataloging of recovered artifacts. Profile P-1 showed a stratigraphy that essentially consisted of modern fill and architectural rubble over bedrock. P-2 was similar to P-1, except that the limit of excavation did not reach bedrock. P-3, which cut through Second Street, showed pavement, curbing, and utility trenches that cut into sterile soils. Construction excavations had already begun prior to the arrival of the archeological monitoring team, exposing a retaining wall along First Street and a pair of limestone foundation walls, along with large quantities of architectural rubble, ceramics, glass, and iron objects. A few other features were documented during construction (Table 2), largely architectural in function. The artifact collection recovered during monitoring was primarily representative of the demolition events that preceded development of the park. The assemblage was dominated by architectural material, ceramics, and glass, which are common on nineteenth- and twentieth-century sites. A few recovered objects were evocative of St. Louis history, including two fire bricks with a "LACLEDE EXTRA" embossment and various bottles with embossments related to local manufacturers. No prehistoric artifacts were found.

TABLE 2

SUMMARY OF FEATURES, PARKING GARAGE MONITORING

FEATURE NUMBER	DESCRIPTION
[not assigned]	Limestone retaining wall along First Street
1	Portions of two limestone foundation walls and a chimney foundation; probable remains of W.H. Bull Medicine Factory, but near project location of Pierre "Cadet" Chouteau, Jr., house
2	Rectangular brick and limestone sewer filled with rubble
3	Limestone foundation of unknown age
4	Corner of a brick structure of unknown age
5 and 6	Brick and limestone foundations of structures along Second Street

Source: Wells and Williams 1985

In 1987 American Resources Group, Ltd. (ARG) reported the results of a historic properties reconnaissance for the St. Louis Harbor area (Rogers et al. 1987). The report included a discussion of the mound group (Site 23SL4) that once was present between I-70 and the riverfront immediately north of present-day Laclede's Landing as well as an inventory of 289 structures that had been constructed from the mid-nineteenth through the mid-twentieth centuries. The 26 mounds of the St. Louis Mound Group (including the somewhat separated "Big Mound"), which were arranged around a central open area, were originally recorded by Thomas Say and Titian R. Peale during the 1819 expedition by Maj. Stephen H. Long (Peale 1862:386-391).

The Archaeological Research Center of St. Louis (ARC) performed salvage excavations at the site of the new Federal Courthouse in Blocks 195 and 205, situated between North Ninth and Eleventh streets and Walnut and Clark streets in 1995 (Naglich and Harl 1995). Investigations at Site 23SL976 recorded numerous foundations, a well, cisterns, and latrine pits dating from 1836 to at least 1950.

In 2004 an Archaeological Survey Memorandum was completed by the cultural resources staff of the Missouri Department of Transportation for investigations associated with the proposed East Bound Interstate Highway I-64 Ramps 7 and 8 Reconstruction (Meyer 2004). Phase II excavations were performed on the properties owned by the Eugene Field House and the St. Louis Toy Museum. Work at Site 23SL2234, also known as Site MoDOTSL6 and the Walsh's Row Site, uncovered a brick sidewalk, structural debris, and refuse materials dating from about 1845 to the mid-twentieth century.

The University of Illinois at Urbana-Champaign performed a Phase I archeological reconnaissance and architectural review for a proposed 100-foot monopole telecommunications tower (Trileaf #5809) near Ninth and Cass streets (Adams 2004). Archeological testing found fill deposits. The study concluded that the proposed antenna did not pose a viewshed issue for surrounding National Register-listed properties.

In 2005 ARC completed an archival evaluation of the proposed Cochran Gardens Development Tract, situated between Seventh and Ninth streets and O'Fallon Street and Cass Avenue (Blocks 579, 580, 584, and 585) north-northwest of JEFF (McLaughlin and Altizer 2005). They recommended additional investigations to determine if prehistoric and historic resources were present.

ARC performed data recovery investigations at the proposed Cochran Gardens Hope VI Housing Development Tract in 2005 (Harl 2006). The archeological work uncovered historic features in Blocks 580, 584, and 585 associated with working class families living in this area during the late nineteenth century. All of the buildings on these three lots were demolished in 1950 and 12 public housing, high-rise apartment buildings were erected. The 12 apartments were razed in 2002. Ten areas were selected for testing. Historic fill deposits were present between 60 and 137 centimeters below ground surface: a brick-lined utility trench for pipes leading to a bath house, 11 building foundations, and 27 "yard features," consisting of a midden, 18 latrine pits, three cisterns, a brick cesspool, a brick septic tank, two manholes, and a modern disturbance.

In 2005 MoDOT archeologists performed data recovery investigations at the Walsh's Row Site (23SL2234) associated with planned improvements to I-64 (Meyer and Austin 2008). The Walsh Row Houses were constructed in the 1840s. House foundations, an attached kitchen foundation, a latrine pit, a refuse pit, and a sewer line were uncovered. The house was demolished in 1934, and associated artifacts date to the 1860s to the 1930s.

K&K Environmental, LLC (2005) completed a Phase I cultural resource survey associated with a proposed roof-mounted antenna at the Crunden-Martin Warehouse, an National Register-listed structure at 760 South Second Street. The study concluded that the proposed antenna did not pose a viewshed issue for surrounding National Register-listed properties.

ARC completed an archeological assessment, an architectural evaluation of National Register listed and eligible architectural resources, and a documentation study of for the proposed Tucker Boulevard tunnel stabilization and roadway improvements in the city blocks bounded by Tucker Boulevard, Cass Avenue, O'Fallon Street, and Eleventh Street (McLaughlin et. al. 2009). The Illinois Terminal Railroad tunnel would be filled to stabilize the structure. Four features were

identified at Site 23SL2309: two brick-lined latrine pits (Features 1 and 3), a possible latrine pit or cistern (Feature 2), and a large basement foundation (Feature 4). All were determined not to be impacted by the proposed project.

K&K Environmental, LLC (2010a) completed archeological and architectural viewshed investigations associated with a proposed roof-mounted antenna situated at 906 Olive Street (Clearwire MOSTL0367). The study concluded that the proposed antenna did not pose a viewshed issue for surrounding NRHP-listed properties.

K&K Environmental, LLC (2010b) completed archeological and architectural viewshed investigations associated with a proposed roof-mounted antenna situated at 215-217 South Eighth Street (Clearwire MOSTL0500). The study concluded that the proposed antenna did not pose a viewshed issue for surrounding National Register-listed properties.

K&K Environmental, LLC (2010c) also completed archeological and architectural viewshed investigations associated with a proposed roof-mounted antenna situated at 210 North Tucker Boulevard (Clearwire MOSTL5623). The study concluded that the proposed antenna did not pose a viewshed issue for surrounding National Register-listed properties.

In 2011 ARC archeologists removed human remains from seven coffin burials associated with the Rutgers Graveyard, also known as the City Cemetery (Site 23SL2324), that had been uncovered by construction workers while expanding the Clean the Uniform company at the northeast corner of South Seventh and Park Streets (Kohn 2011). The cemetery was used from about 1827 to 1852.

B. Regional Prehistory

The prehistory of the region is commonly divided into four primary chronological periods: Paleoindian, Archaic, Woodland, and Mississippian. The Archaic period is subdivided into the Early Archaic, Middle Archaic, and Late Archaic periods. Similarly, the Woodland period is subdivided into the Early Woodland, Middle Woodland, and Late Woodland periods.

Archeologists generally recognize that the earliest human occupation in present-day Missouri was during the Paleoindian Period (12,000 to 8000 BC). It is believed that the aboriginal groups that lived in Missouri and elsewhere across North America at that time consisted of small bands of nomadic hunters. Animal bones associated with distinct spearpoints and other chipped stone tools attributed to Paleoindian sites indicate that these peoples focused on now extinct large animals such as mastodon, mammoths, and giant bison. Undoubtedly they also collected a broad range of fruits, nuts, and edible plants. Their spearpoints tend to be finely crafted. Some point types of this period (e.g., Clovis and Folsom) are long and broad with long, shallow grooves ("flutes") on the sides of the faces. Other varieties (e.g., Meserve and Brown's Valley) have shorter flutes. Scottsbluff, Hell Gap, and Alberta type points have broad stems. Eden and Angostura type points are long and narrow.

The Dalton period (8000 to 7000 BC) is transitional between the Paleoindian and Archaic cultural patterns (Chapman 1975:29). There is a shift from primarily hunting large game species

to selecting smaller game animals and increased foraging for plant species. It is believed that this shift was the result of warming temperatures at the end of the Pleistocene. The flutes on these spearpoints are much shorter than those typically found on Clovis or Folsom points. The base is concave and tangs are often present at the edge of the base. The sides of the points or knives are sometimes fashioned to give them a multi-pointed (serrated) edge. Bone awls and needles, adzes, spokeshaves, groundstone mortars, manos, pestles, and hammerstones are also found.

The Early Archaic period (7000 to 5000 BC) is characterized by a further broadening of the variety of food resources used by aboriginal groups. Animal and plant remains at archeological sites show increased amounts of fish, shellfish, waterfowl, small game animals, and wild plants. Paralleling this diversification are changes in the kinds of tools recovered. Projectile points include side- and corner-notched forms in addition to straight stem and contracting stem types. Common types include Rice Lanceolate, Rice Lobed, Rice Contracting Stem, St. Charles Notched/Thebes, Graham Cave Notched, Hidden Valley Stemmed, Hardin Barbed, Agate Basin Lanceolate, and Nebo Hill Lanceolate. Scraping tools increased in variety. Fish weirs were built, and traps and nets were fashioned. Groundstone items include mortars, manos, pestles, hammerstones, bannerstones, and gorgets. The size of the social groups or bands remained modest and probably included extended families (Chapman 1975). Two sites that yielded tremendous information about the Archaic period in Missouri are Graham Cave and Arnold Research Cave.

During the Middle Archaic period (5000 to 3000 BC) the climate became warmer and drier. Small bands of related families utilized multi-seasonal base camps and some permanent camps as they procured a diverse array of game animals, plants, and nuts. Side-notched projectile points are characteristic of this period and include Raddatz, Black Sand, Big Sandy, Jakie Stemmed, and White River Archaic varieties. Chipped stone raw materials were commonly heated to improve their flaking quality. Full-grooved and ungrooved ("celt") axes appeared during this period. Twined-fiber fabrics, sandals, mats, braided cordage, and twisted cordage have been found in Middle Archaic sites. Bone and shell ornaments were fashioned (Chapman 1975:158-159). Other tools include antler hammers, cupstones, mortars, pestles, and bone awls.

The Late Archaic period (3000 to 1000 BC) peoples adapted to a prairie-forest edge environment in Missouri, with a focus on local environments. Camps tended to be larger, and more lithic raw material was brought to camps to be reduced and shaped into tools. Projectile points were reduced in size and dart points, rather than spearpoints, were more common. Typical point varieties include Smith Basal Notched, Afton Corner Notched, Table Rock Stemmed, Etley Stemmed, Sedalia Lanceolate, and Stone Square Stemmed. The lower number of projectile points and animal remains found at sites suggests a reduced emphasis on hunting and increased reliance on plant foods. Chipped stone tools used for digging or pulping vegetal foods (e.g., the Clear Fork Gouge and the Sedalia Digger) were prevalent in Missouri during this period. Gourds and squash remains are among the earliest evidence of Midwestern horticulture. Rudimentary pottery was used to cook and/or store foods. Large stone knives or daggers were being fashioned. Groundstone artifacts included winged, cylindrical, and hour-glass bannerstones, plummets, manos, anvilstones, celts, full and three-quarters grooved axes, and stone beads. Bone items include tubular beads, fleshers, punches, needles, and awls. Dead individuals were interred in specially constructed cemeteries and burial mounds. Bones were covered in red ocher and

bundled together for burial. Tools and ornaments were placed with the human remains in graves (Chapman 1975).

The Early Woodland period (1000 to 500 BC) is not well represented in Missouri, suggesting that Late Archaic traditional patterns continued through much of the area. Sites show an increased use of bottomland resources with occasional trips into the uplands for specific resources. The sites tend to be small temporary encampments adjacent to rivers and major tributaries (Martin 1997:88-89). Projectile points of the period are typically long-stemmed Kramer points and contracting-stemmed Burkett, Adena, and Gary Stemmed points. Although ceramics at Early Woodland sites in Missouri are rare, the relative amount of pottery suggests that the use of ceramics to prepare and/or store food increased. Grit-tempered Marion Thick is a common ware type.

The Middle Woodland period (500 BC to AD 400) is also not represented throughout the state. The most well-known cultural complex of the Middle Woodland in Missouri is Hopewell. This complex is known for its highly decorated ceramics and for copper ornaments, conch shells, grizzly bear teeth, and artifacts of galena, obsidian, and mica that represent trade from long distances. These peoples constructed burial and effigy mounds on bluffs, upland ridges, and high terraces/benches overlooking major stream valleys. They lived in large villages along the waterways, which are assumed to have been important routes for an extensive trade network. Kay (1979, 1980) has suggested that some strategically located sites were nodal villages where raw materials or manufactured goods were brought from outlying villages to be exchanged for trade items.

Two important elements distinguish the Late Woodland period (AD 400 to 900): the widespread use of the bow and arrow and pervasive cultivation of several plants, including maize. Lambsquarter, knotweed, maygrass, and little barley were also important cultigens (McLaughlin and Altizer 2005:9). Late Woodland groups occupied hamlets and villages situated on bluff margins, terraces near the base of bluffs, and narrow bottomlands along stream valleys. They constructed small earthen and stone cairns as well as mounds on hills and ridges overlooking the villages. Pottery styles consist primarily of conical jar and bowl-shaped vessels tempered with crushed stone and decorated with cordmarked exterior surfaces. Trade remained important, though less extensive than during the Middle Woodland period. Gulf Coast marine shell beads have been found. Burial mounds built in this period are smaller in size but continue to be placed on the bluff margins overlooking some villages. Burials include extended, flexed, bundled, and cremated interments. Grave goods are rare (Chapman 1980:80).

The Mississippian period (AD 900 to 1400) in Missouri and the surrounding region is best known for mound complexes such as Cahokia and the St. Louis Mounds (O'Brien and Wood 1998). Large villages and towns of several thousand people were established along major waterways; however, smaller villages were also present. Maize agriculture was the principal economy, replacing native seed cultigens. Ceramic vessels with shell tempering were made in a variety of shapes. Small triangular arrow points with side or basal notches were the typical projectile points. High-quality Burlington chert was quarried for trade to other groups (McLaughlin and Altizer 2005:9). Broad-bladed scapula hoes and spades were utilized.

From about AD 1250 to 1700, a cultural group identified by archeologists as the Oneota inhabited the Prairie Peninsula in portions of Missouri, Illinois, Indiana, Wisconsin, Iowa, eastern Nebraska, and Eastern Kansas. Historic-period groups, such as the Illini, Ioway, Kansa, Missouria, Omaha, Osage, Oto, Ponca, and Winnebago have been linked to the Oneota (Alex 2000:187; Bailey 2001:476). Oneota sites are minimally recognized by the presence of shell-tempered, globular pottery featuring paired loop handles. They are found on or near ecotones, where floodplain forest, upland forest, and prairie resources are all accessible (Tiffany 1979:L91). Villages are large and include hundreds of deep storage pits. Their economy was a mix of hunting of large and small game animals, trapping, fishing, harvesting wild plants, and intensive cultivation of maize, beans, and squash. Tools include small, triangular, and unnotched (e.g., Madison) arrow points, drills, gravers, knives, snub-nosed scrapers, and bone hoes made from deer and bison scapula (Alex 2000).

The historic-period Native American tribe that is best known in Missouri is the Osage. When French explorers reached the area in 1673, the Osage were living in a number of villages along the Osage River and its tributaries in southwestern Missouri. Attributes of the Osage cultural material and lifeways suggest that they may be related to the Oneota in the region (Bailey 2001:476). The Osage occupied permanent villages of mat or bark-covered wigwams and relied on a mixed economy of horticulture, hunting, and gathering. Corn, beans, squash, and tobacco were grown in small fields. Bison, elk, deer, and bear were hunted, a variety of small game and waterfowl were trapped, and fish and shellfish were harvested. The pelts and skins of beaver, otter, bear, and deer were particularly important trade items. A diverse array of nuts, tubers, fruits, and plants were collected for food, medicines, and raw materials. Horses did not have a major impact on Osage culture, but firearms and control of European and American manufactured goods allowed the Osage to assert control over a broad territory in parts of present-day Missouri, Arkansas, Oklahoma, and Kansas throughout the 1700s. In the mid-1800s the Osage became middlemen in the bison robe trade (Bailey 2001:477-478). With the expansion of Euro-American settlement westward in the early 1800s, the Osage were pressured to cede their territory in Missouri; however, many refused to move their villages to reserved lands in southeastern Kansas. They raided eastern tribal groups who were being resettled in their Missouri hunting lands. In 1871 the Osage reluctantly moved their villages to reserved land in Oklahoma (Bailey 2001:478).

C. HISTORIC CONTEXT

The historical chronology presented below is adapted from developmental periods outlined by the City of St. Louis Cultural Resources Office (CRO) in the 1995 St. Louis City Preservation Plan.

1. Exploration and Contact (ca. 1630 to 1764)

The earliest penetration into the lower Mississippi Alluvial Valley was made by the DeSoto expedition when it crossed the Mississippi River in the spring of 1541 into what is now Arkansas. More than a century passed before the French began to explore the Mississippi Valley from their outposts in the Great Lakes. In 1673 Jacques Marquette and Louis Joliet reached the Mississippi River as far south as the Arkansas River and later descended the length of the

Mississippi and claimed the entire valley for France, naming it Louisiana. The earliest French settlements in the Middle Mississippi Valley were made in the 1690s and early 1700s at Cahokia, Kaskaskia, and Fort des Chartres.

2. The French Village (1764 to 1819)

St. Louis was established as a fur trading post in 1764 by Pierre Laclède and Auguste Chouteau. Laclède was a minority partner in the firm Maxent, Laclède and Company that had been granted exclusive rights to the Indian trade in 1760 by the French governor of Louisiana. Laclède ventured upriver in February 1763 to search for a location for a trading post, ultimately settling on a site on the west bank of the Mississippi, a few miles below the mouth of the Missouri River. Laclède's assistant, Auguste Chouteau, returned in the spring of 1764 with a company of men who readied the site for settlement by clearing land, laying out streets, and building cabins and a storehouse for the goods and supplies.

The site selected by Laclède for his trading post was ideally situated for trade, given its location near the mouths of the Missouri and Illinois rivers, providing ready access to the western territories of Louisiana as well as the interior of Illinois and the upper Midwest. One of the earliest descriptions of the village recognized the importance of that location for what would soon become a burgeoning river trade:

> This place occupies one of the best situations on the Mississippi, both as to site and geographical position. In this last respect, the confluence of the Ohio and Mississippi, has certainly much greater natural advantages, and St. Louis has taken a start, which it will most probably retain. It is perhaps not saying too much, that it bids fair to be second to New Orleans in importance, on this river [Brackenridge 1814:218-219].

The town was laid out with three principal streets running parallel to the river (north-south) with secondary streets at the perpendicular. Typical blocks were laid out in a rectangular form, measuring 300 feet east-west and 240 feet north-south. The original measurements were in French feet[4], which were slightly longer than English feet. The original streets were quite narrow by modern standards, with the main streets given a width of 36 feet and the cross streets laid out with a width of 30 feet.

The names applied to the major streets reflect St. Louis's origin as French territory (Table 3). The original village included a total of 49 blocks, with 15 blocks between the river bluff and Main Street, 19 blocks between Main and Second streets, and 15 between Second and Third streets (Scharf 1883) (Figure 5). Siting the village on a limestone escarpment that rose some 35 to 40 feet above the river afforded a measure of flood protection but it made it somewhat difficult to reach the river from the town. The foot of Market Street fell on a low spot, which provided a convenient place to chop a passage into the bedrock to facilitate access to the river.

[4] A French foot is equal to about 12.79 inches (Calvert 2010), so the original squares would have measured approximately 256x320 English feet and the street widths would have been about 32 and 38.3 English feet. Other French units of survey measure include the arpent (equivalent to 180 French feet or 192 English feet) and the toise (equivalent to 6 French feet) (Cardarelli 2003).

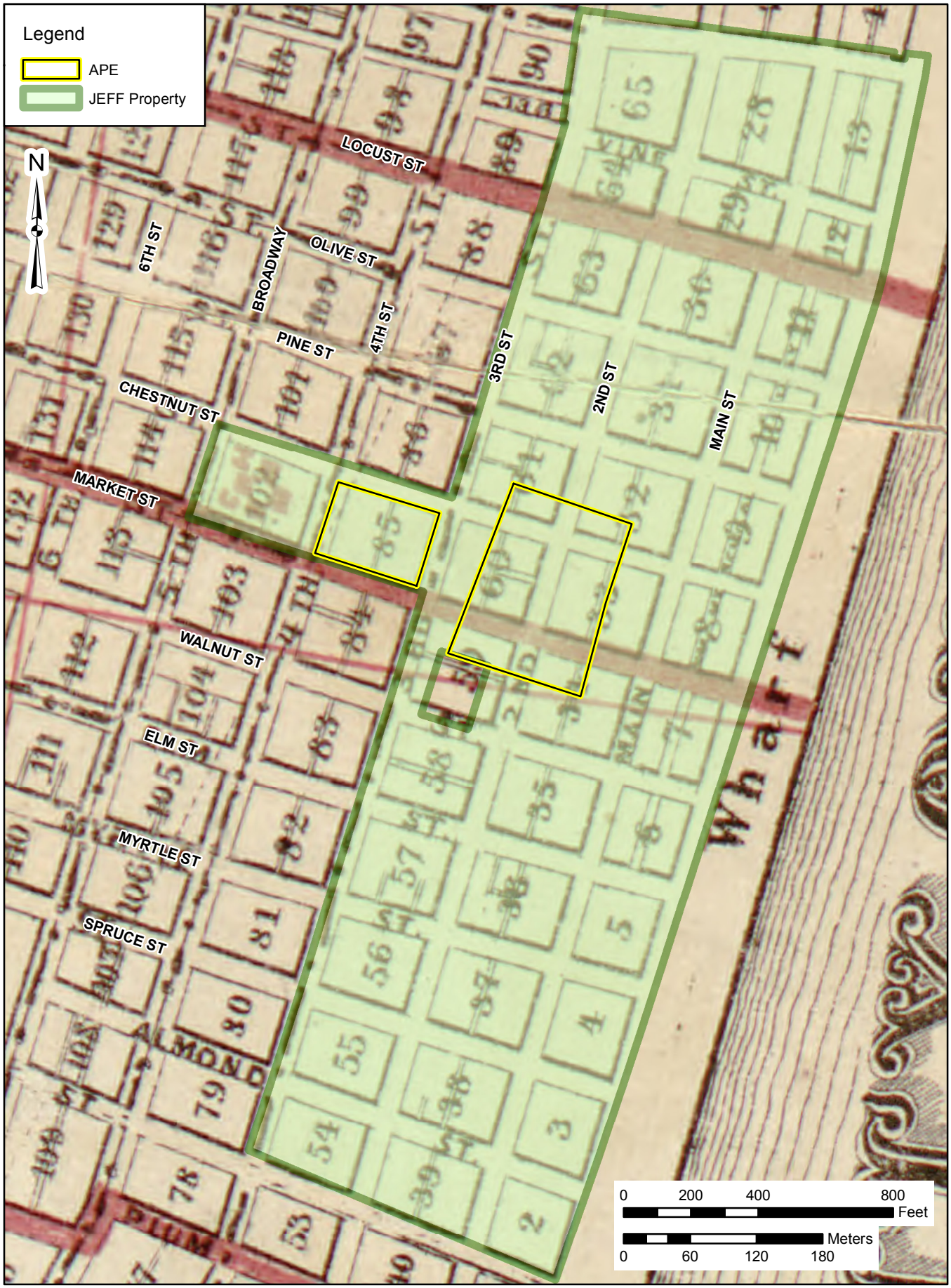


FIGURE 5: Base Map of City Blocks

SOURCE: Hutuwa 1870

There was no street along the riverfront. Instead the first row of blocks was set along the bluff edge, which, owing to its irregular form, fell at a distance varying from 150 to 200 from Main Street (Billon 1886). Figure 6 illustrates the layout of the village as it existed ca. 1804-1805.

TABLE 3

ALTERNATE STREET NAMES

ORIGINAL NAME	ALTERNATE/MODERN STREET NAMES
Grande Rue	La Rue Royale, Rue Principâle, Royal Street, Main Street, First Street
Rue d'Eglise	Church Street, Second Street
Rue des Granges	Rue de Barrère, Third Street
Rue de la Tour	Walnut Street
Rue de la Place	Market Street
Rue Missouri	Chestnut Street
Myrtle	Clark
Almond	Valentine

The squares between Walnut and Market streets were laid out somewhat larger than the typical squares, measuring 300 foot on each side. Walnut and Market streets were the major east-west streets, forming the core of the village. Block 7 (bounded by Main, Market, and Walnut streets and the river) was set aside for a public market in 1764 and was known as the *Place d'Armes* (Parade Grounds) and the *Place de Publique* (Market Place). Chouteau reserved the block immediately to the west (Block 34) for his residence and business. Block 59—bounded by Second, Third, Market, and Walnut streets—was set aside for a Catholic church and cemetery.

Many of the Squares were divided into quarters (each measuring 150x120 feet) that were granted to settlers on the condition that they make improvements within one year and one day of the grant. In some cases settlers received half-square lots. The earliest Squares occupied (in 1764) were 2, 8, 16, 25, 31, 34, 44, 50, 58, 60 (southwest ¼), and 64 (northwest ¼). The large size of these lots allowed villagers to maintain orchards and gardens on their houselots; common agricultural fields were located outside the platted village.

The Indian trade was quickly established and more than two dozen tribes visited the village to receive goods and commodities such as blankets, weapons and ammunition, tobacco, liquor, trinkets, and foodstuffs in return for deerskins and beaver pelts. The village grew steadily, sustained primarily by the fur trade, and by 1770 the population had grown to about 700, many of whom were hunters and voyageurs. The census of 1773 had 285 white males, 159 females and 193 African slaves; an additional population of Indian slaves was present but not reported, as it was illegal to hold Indian slaves (Primm 1998:25). Despite the importance of the fur trade in St. Louis, the regional economy depended more on agriculture, particularly wheat and tobacco.

Most of the first houses built were of log construction (Billon 1888) following French colonial building traditions. The earliest buildings followed the *poteaux en terre* (posts-in-ground) building tradition, which relied on vertical, earth-fast logs as the main structural system. Less common was *poteaux sur sole* construction (posts-on-sill), which consisted of a heavy wood sill

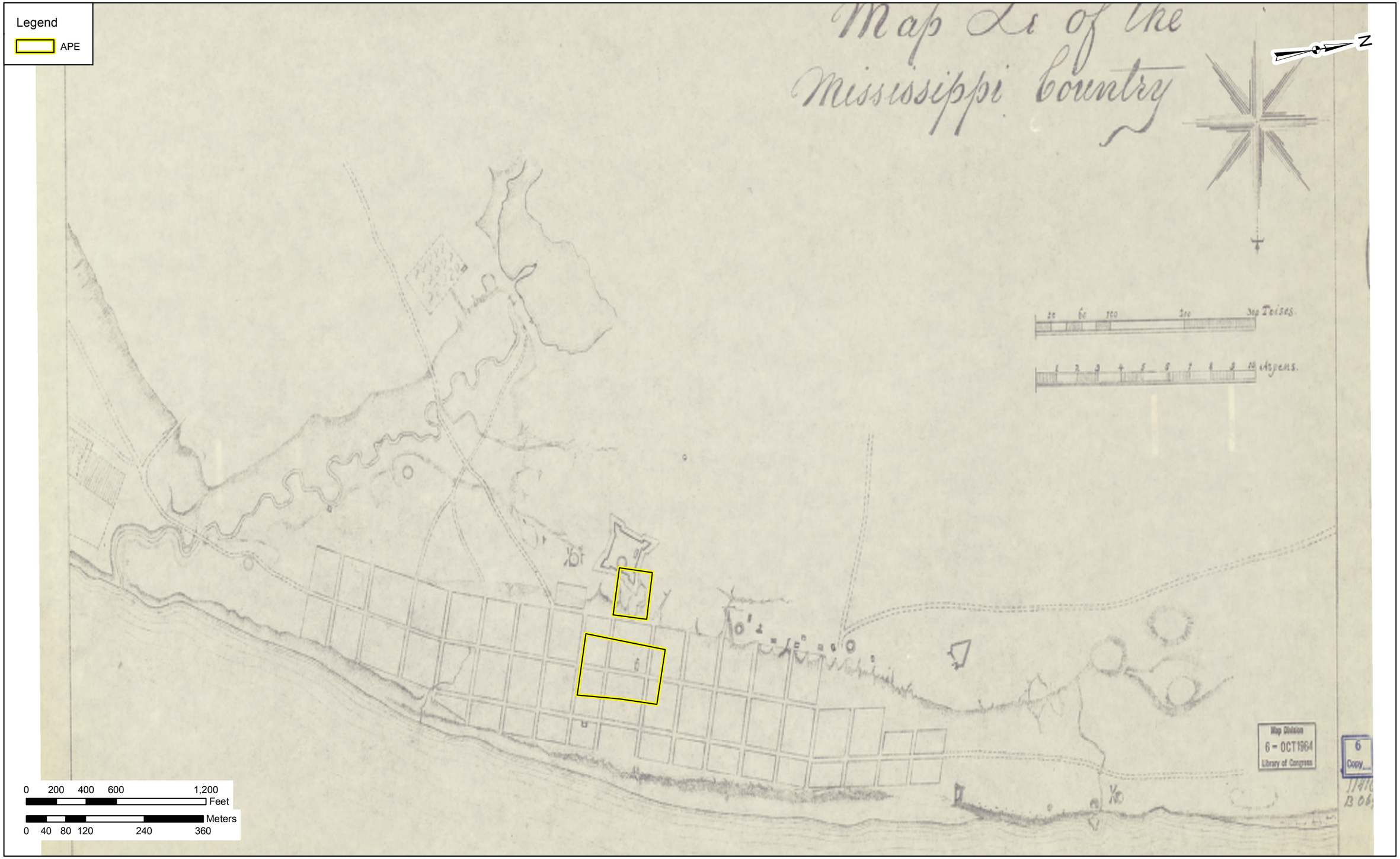


FIGURE 6: Village of St. Louis, ca. 1804-05

SOURCE: Wayman 1953

that rested on a stone foundation (Cultural Resources Office [CRO] 1995). The first stone house was built on Block 34 in 1764 by Laclède to serve as his business place and residence. Given its multiple uses, it was quite large, measuring 34x40 (or 50) feet, and it was later used as a place of residence by the territorial governors (Scharf 1883).

An early traveler described the village:

> From the opposite bank St. Louis, notwithstanding, appears to great advantage. In a disjointed and scattered manner, it extends along the river a mile and a half, and we form the idea of an elegant town. Two or three large and costly buildings (though not in the modern taste) contribute in producing this effect. On closer examination the town seems to be composed in equal proportions of stone walls, houses, and fruit-trees, but the illusion continues. On ascending the second bank, which is about forty feet above the shore level of the plain, we have the town below us and a view of the Mississippi in each direction….There is a line of works on this second bank, erected for defense against the Indians, consisting of several circular towers, twenty feet in diameter and fifteen in height, a small stockade fort, and a stone breastwork. These are at present entirely unoccupied and waste, excepting the fort, in one of the buildings of which the courts are held, while the other is used as a prison. Some distance from the termination of this line, up the river, there are a number of Indian mounds and remains of antiquity, which, while they are ornamental to the town, prove that in former times those places had also been chosen as the site, perhaps, of a populous city [Brackenridge 1814:219-220].

The defensive works described by Brackenridge were a fortification built in anticipation of an Indian raid that materialized in May 1780, which subsequently became known locally as *l'année de grand coup.* The origin of the attack, which resulted in the deaths of five villagers who were slain in their fields outside the village, was not known at the time. In the months before the attack, rumors had circulated that the British were instigating their Indian allies in the Great Lakes region. Descriptions of the fortification system indicate that it was to include four circular stone towers arranged around the village. Work began first on the west tower as it was believed that the attack would come from that direction. The west tower was sited on a hill near a location that would later become the intersection of Fourth and Walnut streets, a location that would encompass the eastern portion of Block 82 and the western portion of Block 83, placing it just west of Luther Ely Smith Square. Work on the west tower was almost complete by May 1780, and the remainder of the village was defended only by a line of entrenchments. The west tower or fort was soon abandoned as a military post but used as a barracks for few years by U.S. soldiers after 1804; it was subsequently used as a jail until 1818 or 1819 (Scharf 1883). Remains of the west tower probably disappeared when Walnut Street was extended west of Third Street (Primm 1998; Scharf 1883). Wayman's map of the village as it existed circa 1804-1805 (see Figure 6) shows a rectangular palisade near the intersection of Walnut and the future Fourth Street.

Culturally, French building traditions were strongest in the earliest decades, and many of the village's earliest settlers migrated from Fort Chartres, along with settlers who had been living in the bottomlands on the east side of the river. After the 1803 acquisition of the Louisiana Territory, the town's American population increased, bringing new cultural traditions and an element of "lawyers, speculators, and office seekers" (Primm 1998:62). By 1818 the American population exceeded that of the French (Brackenridge 1814; CRO 1995). The newly arrived

Americans favored frame houses over the French creole forms, but brick construction gained in popularity after 1812 because all available timber had been harvested within at least 10 miles of the town. Brick construction became so popular that it led to a ban on brick-making within the town limits, because of the smoke (Primm 1988:82, 132).

The first commercial buildings in the village were built along Main Street, where they had ready access to the river. Stone warehouses began to appear after 1803, defining St. Louis's first commercial district. A total of 33 stone buildings was built in the village during the period from 1804 to May 1821, including dwellings, a tavern, a bakehouse, a blacksmith shop, a hotel, several warehouses, and the first market house. The blocks between First and Third streets developed as a mix of domestic and commercial buildings in the first decades of the nineteenth century (Table 4). The village grew slowly in the years immediately following the War of 1812, but a wave of new settlement and building began in 1816. By 1818 St. Louis had fully recovered from the economic depression that followed the War of 1812, and more than 100 new houses were built in that year. The town had by then managed to attract a variety of merchants, tradesmen, and industries, becoming home to brickmakers, bricklayers, lime-burners, a plasterer, a painter, stone cutters, tailors, boot- and shoemakers, a lumber mill, and a brewery (Scharf 1883). The overall form of the town had changed slowly, however, and as late as 1818 it had not expanded west beyond Third Street.

3. The Walking City (1820 to1869)

The arrival of the steamship *Zebulon M Pike* in August 1817 heralded a period of rapid growth that established St. Louis as a major center for commercial traffic. Docking at the foot of Market Street, the *Pike* required polemen to supplement its tiny engine, and it was actually smaller than some keelboats (Primm 1998:108). Keelboats continued to work along with steamboats, but ultimately steamboats proved vastly more efficient. In the 1830s steamboats could reach New Orleans in 12 to 14 days while keelboats needed 90 to 100 days for the same voyage (Primm 1998:134). With the steamboat traffic, St. Louis was well connected to other trading centers in the upper Ohio River valley, including Cincinnati, Louisville, and Pittsburgh.

After the explosive growth that began in 1816, St. Louis was incorporated as a city in 1822. It was served by all manner of businesses, professionals, and tradesmen (Table 5), most of whom had arrived after 1817 (Primm 1998:109). The optimism that fueled the boom of 1816-1820 quickly vanished in 1820 with an outbreak of malaria that killed 121 people and a banking crisis that led to many business failures. By the time the city charter was put to a vote, St. Louis's population had declined 35 percent.

The newly formed government focused much of its attention on improvements to the city's infrastructure, which left much to be desired. Most of the streets were unpaved and poorly graded, and there was still no street along the river. The original streets that had been laid out by Laclède were irregular in many areas, as builders had encroached on the public right of way. Among the first acts of the Board of Aldermen was to decree that streets and sidewalks would be paved and that 15-foot-wide alleys would be opened through each block. Despite the intentions of the new government, most of the streets remained unpaved for at least a decade after the city was incorporated (Primm 1998:121-122). Improvements to the riverfront were seen as vitally

TABLE 4

STRUCTURES BUILT FROM 1804 TO 1821 IN THE STUDY AREA

YEAR BUILT	BLOCK	DESCRIPTION	TYPE	OWNER
1811	60	Double-frame dwelling	Frame and Log	Dr. B.G. Farrar
1812	31	Frame store	Frame and Log	David Delaunay
1812	33	Bake-house	Stone	Everson
1812	35	Two-story frame store and dwelling	Frame and Log	Madame Pescay
1812	7 (Public Square)	Market-house with 12 stalls	Stone	[public]
1813	31	Frame store	Frame and Log	Wm. Morrison
1813	32	Two-story frame	Frame and Log	M.P. Leduc
1814	32	Two-story addition to old house	Stone	Veuve Papin
1815	32	Two offices and dwelling above	Brick	Hyp. and Sil. V. Papin
1815	61	Small dwelling	Stone	Antoine Renand
1816	32	Double, two-story, two stores	Brick	McKnight & Brady
1816	35	Small frame	Frame and Log	Abraham Gallatin
1816	61	Two-story frame dwelling	Frame and Log	Josiah Brady
1816	61	One-story frame shop	Frame and Log	Josiah Brady
1816	62	Two-story frame dwelling	Frame and Log	Clement B. Penrose
1817	61	Frame shop	Frame and Log	Wm. Cabeen
1818	31	Two-story frame dwelling	Frame and Log	Aug. P. Chouteau
1818	32	Blacksmith shop	Stone	Hyp. and Sil. V. Papin
1818	33	Two-story frame dwelling and office	Frame and Log	Ephraim Town.
1818	33	Three frame stores	Frame and Log	Frederick Dent.
1818	33	Two-story store	Brick	Antoine Chenie
1818	58	Two-story frame	Frame and Log	Evariste Maury
1818	60	Log dwelling of posts	Frame and Log	Francis Creely
1818-19	33	Two-story store and dwelling	Brick	Elijah Beebe
1819	31	Two-story dwelling	Brick	Chas. Bosieron
1819	85	Two-story dwelling	Frame and Log	Mrs. Eliza Fair
1819	85	Brick livery stable	Brick	Christ. M. Price
1819-20	33	Banking house	Brick	Bank of Missouri
1820	31	One-story dwelling	Brick	Jean Louis Provenchere
1820	35	One-story shop	Brick	Abr'm Gallatin
1820	59	Two-story college building	Brick	Bishop L. William Dubourg
1820	85	Ten one-story offices	Brick	John Jones row.
1821	60	Frame shop	Frame and Log	Joseph Klunk
1821	60	Frame shop	Frame and Log	James J. Purdy

Note: The study area includes Blocks 32, 33, 34, 59, 60, 61, and 85, which encompass the APE.

Source: Billon 1888; Scharf 1883:149

TABLE 5

BUSINESSES, PROFESSIONS, TRADESMEN, AND INDUSTRIES IN ST. LOUIS, 1821

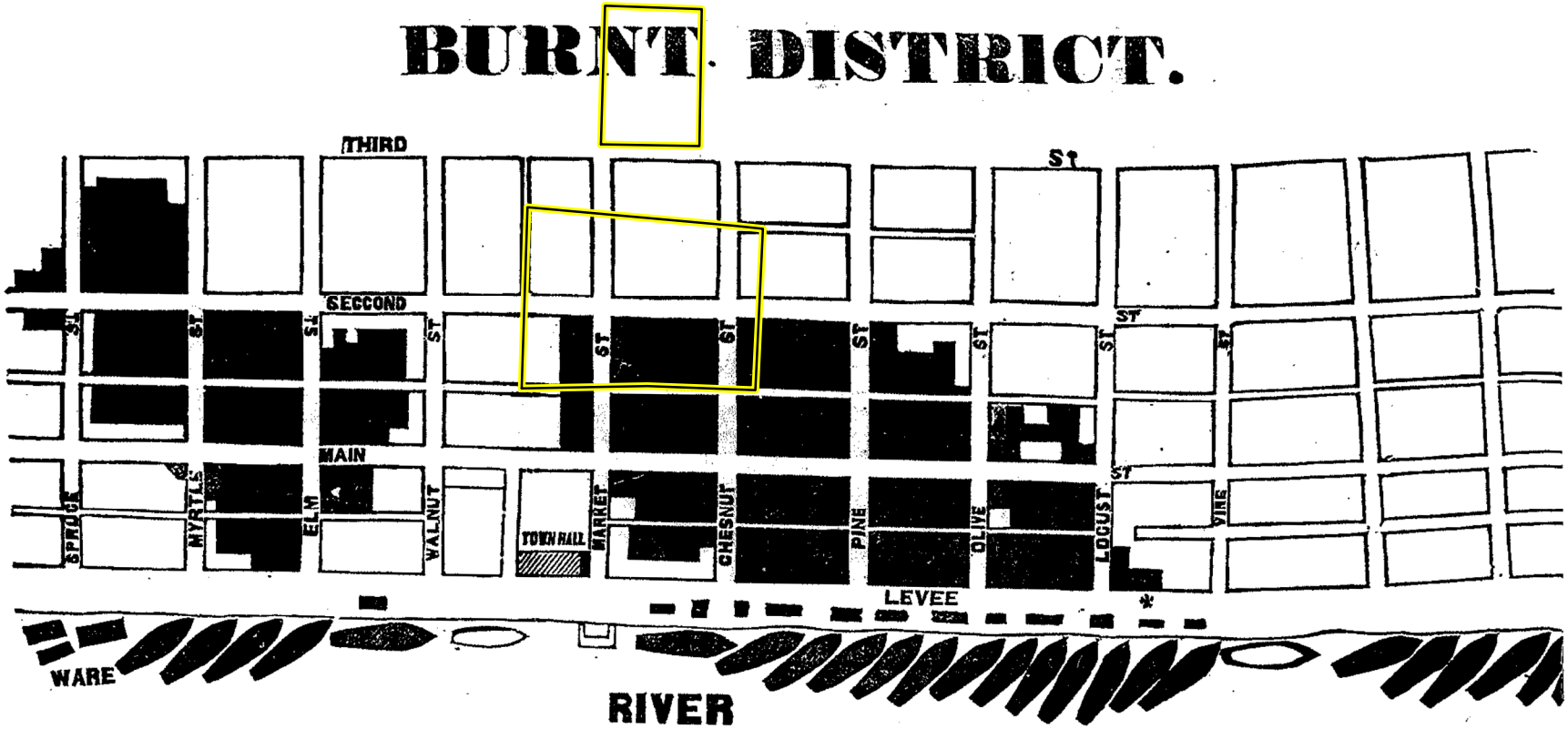
46 mercantile establishments	1 tannery	4 hair dressers and perfumers
1 bookstore	3 soap and candlemakers	2 confectioners and cordial distillers
2 binderies	2 brick yards	1 bell man
3 large inns	3 stone cutters	5 billiard tables
small inns, taverns, boarding houses	14 bricklayers and plasterers	4 coopers, block-, pump-, and mast-makers
6 livery stables	28 carpenters	4 bakers
57 grocers and bottlers	9 blacksmiths	1 comb factory
24 attorneys and counselors at law	3 gunsmiths	several professional musicians
1 portrait painter	2 copper and tinware manufacturers	13 physicians
1 silver plater	6 cabinetmakers	3 druggists and apothecaries
1 engraver	4 coachmakers and wheelwrights	3 midwives
1 brewery	7 turners and chairmakers	3 auctioneers
3 hatters	3 saddle and harness manufacturers	3 weekly newspapers
12 tailors	13 boot and shoe manufacturers	10 ornamental sign- and house-painters and glaziers
5 clock- and watchmakers, silversmiths and jewelers	1 nail factory	

Source: Paxton's Directory (1821), transcribed in Scharf 1883:360

important to the town's economic health, so a new street was laid out along the riverfront; sometimes known as First Street, its importance was recognized by its alternate name of Main Street. The levee between First Street and the river was a commercial zone for docking of steamboats and transshipment of material. As late as the 1840s, the levee was unpaved, so disembarking travelers walked in mud, along with horses and mules that pulled drays. The central section was paved in stone in 1845, and a bond issue in 1854 financed the paving of an entire mile along the river (Primm 1998:150).

With the booming steamboat trade, the riverfront area east of Fourth Street continued to develop as St. Louis's first commercial district. The first commercial structures along the riverfront were three and four stories tall and built of brick. The first story typically contained a storefront that was separated into three bays, and the upper floors contained office space with windows (CRO 1995). By the 1840s St. Louis had become a major transshipment point for furs and hides, lead, iron, yellow pine, beef, pork, poultry, whiskey, hemp, tobacco, and corn (Primm 1998:135). By the 1820s the fur trade, which provided the initial impetus for the founding of St. Louis, had reached the Rocky Mountain territory. Companies based in St. Louis, such as the Rocky Mountain Fur Company, made huge profits in buffalo hides and beaver pelts.

A devastating fire destroyed a large swath of the downtown area when the steamer *White Cloud* caught fire in May 1849 (Figures 7 and 8). The fire spread to other boats, then to the levee, and soon to buildings that were packed into the riverfront district. Thousands of people were thrown out of work, hundreds were left homeless, and many businesses were destroyed (Primm 1998:167). Much of the area that is now contained in JEFF park land was destroyed, which led to a reconfiguration of the downtown commercial district. In the study area a portion of First Street (Main) was widened to 60 feet, and Second Street was paved (CRO 1995).



Legend

APE

0 200 400 800 Feet

0 60 120 240 Meters

FIGURE 7: Areas Destroyed by 1849 Fire

SOURCE: The Saint Louis Weekly Reveille 1849

FIGURE 8: Ruins of the Great St. Louis Fire, 17-18 May 1849 (Thomas M. Easterly daguerreotype)

SOURCE: Missouri History Museum, St. Louis

Steamboat traffic expanded rapidly in the 1840s and 1850s, bringing a second cycle of development along the riverfront and resulting in the replacement of many of the earlier buildings (CRO 1995). At the peak of the steamboat trade, as many as 50 steamboats would dock at the levee. By 1853 a total of 45,500 tons of freight was handled at the levee, but by 1860 the total had reached 844,000 (McCarthy 1991). The crowded steamboats along the levee became the most iconic scene of St. Louis in the nineteenth century (Figure 9).

As commercial trade grew by leaps and bounds, the city expanded to the west, and by the mid-nineteenth century the commercial district was centered on Fifth Street, with a concentration of retail establishments at Washington and Fourth streets. The Merchant's Exchange, completed in 1857 on Third between Chestnut and Pine streets (Block 86), anchored the late nineteenth-century commercial district while the lower riverfront blocks retained a concentration of warehouses. Building heights began to reach five and six stories in the 1850s. The first six-story building was Barnum's Hotel, which was located on Block 34 facing Walnut Street. Completed in 1854, Barnum's was a favorite gathering spot for wealthy travelers and businessmen.

Commercial activity was its most notable characteristic, but the riverfront area retained a mix of residential, commercial, and industrial structures at mid-century, as the streetcar had not yet allowed creation of suburban residential enclaves. An 1845 description of the riverfront area provided by an anonymous author in the nineteenth century provides a ground-level view of distinctive neighborhoods that existed on some of the blocks that would ultimately become JEFF park lands. As the traveler noted, the city was in a period of rapid transition, with residential areas soon to be displaced:

> A WALK IN THE STREETS OF ST. LOUIS IN 1845, BY A TRAVELER
>
> If he comes in upon a boat, the town seems covered and defended by a fleet of steamboats, exhibiting a forest of chimneys. On nearing and taking a more deliberate view, the Front street or Levee, as it is sometimes called, first attracts the attention; here the shipping on board of boats and landing business from them for the commerce of several States of the West is mainly transacted. The front street is irregularly built, and here you will see a row of stone stores, generally of three to four stories above the cellars, and then here and there intervenes a low shanty kind or building, where liquor and other commodities are sold by retail, not dissimilar from what has been so emphatically noted and quoted, "a palace and a hovel in close contiguity"; but not many frame houses throughout the whole are observable. It is a considerable time since the corporation passed an ordinance annexing a penalty to the erection of buildings of materials wholly of wood, and which has been round to amount nearly to prohibition.
>
> Many of the stores in Front street are composed of a species of limestone dug out of the ground floor, of which the quality approximates to fine marble.
>
> …
>
> The Levee is a sort of Sanctum Sanctorum of commerce, and this body holds almost exclusive and unmixed possession of the commercial front of the city. Its extremities, however, north and south do not possess the same business importance.
>
> *Main Street* is of a different character; in it are found the auxiliary occupations to commerce. Printing offices, Dry Goods stores, Auctioneers, Book Stores, Paper sellers, Artizans, Druggists and Apothecaries, Hardware establishments, &c., &c. This street is narrow and bears evident marks of being that part of the town first built, yet there is a great inequality in the appearance of the buildings, some of them being adapted to the

FIGURE 9: Detail of *Our City (St. Louis, Mo.)*

SOURCE: Janicke & Co. 1859

advances made in general wealth, population and capital, while others remain in their incipient state as they might have been supposed to be under the ancient French or Spanish dynasty. Rows of three story well built houses, substantial, however, rather than elegant, are found in this street….

Second Street.-The cross streets which run from Main to this, are of a mixed character-Olive containing Printing Offices, Justices Offices, and Pine containing, also, Justices and Lawyers Offices; Locust is nearly the same.

Second Street begins to display a distributive and accessory commercial character of the third degree, and very mixed in character, for in it are found some private dwelling houses, manufacturers, fruiterers, metal workers, locksmiths and artizans-also, employments tributary to the arts and literature, as lithographic and engraving businesses; house painters, dry goods, and grocery stores.

Many persons foretel an entire change in this street of its commercial character, viz., that it will take the place of Main, and in process of time, and that not before a long period either, exclude every vestige of a private dwelling, by the respectability, magnitude and number or its commercial distributive establishments. This may be near, or it may be rather more distant, than sanguine owners of real estate might be disposed to make it, but, without doubt, keeping in view the vast and rapid increase of the place in houses and population, it will not be long before it is accomplished.

Third Street.-The same observations which have been made upon the cross streets between the other commercial streets parallel to the river, will apply to the cross streets leading up from Second to Third. Lawyers and doctors offices, and hotels and boarding houses, are distributed through the varied business divisions of the city generally, and they are found in the locality just described.

Third Street contains some ground not yet appropriated to good buildings, or to any-yet, to make amends, there are one or two splendid and tasteful urban villas to be found here, of which one is the residence of Meriwether Lewis Clarke, Esq.

The City Hotel has, also, one of its fronts on this street, with a very fine lawn for a lounge, an exceedingly ornamental, as well as comfortable, appendage to a public establishment of this sort. It is the site also of the new market, a most growing place, having increased in its products, deposit and surrounding population, with a most wonderful rapidity. A little beyond this market, on the north side, Third street terminates in Broadway.

Market Street. – This is one of the very first spots that a stranger would feel inclined to visit, from its position. firstly, and afterwards for its own sake. It has breadth and openness-it is the seat of the Old or Centre Market-it also has the seat of the Muses, for Concert Hall is here, and its stores are characterized by variety-and on the left, with your face towards the Courthouse square and Fourth, many of the stores are elegant in appearance, and do considerable business.

Chestnut Street -- Although a cross street, is sufficiently important to require a separate notice. In its width, being enlarged beyond Second, in being the location of the Postoffice, and beyond Third, being the Amen corner for Literary Depots, Circulating Libraries, &c. Its contiguity to the Courthouse also adds to its relative importance, and as to some or the buildings, if they are not exactly what could be wished as to location, time will bring the remedial ointment for the wound. Width and superior locality will effect every thing that can be desired for it, in few years [St. Louis Business Directory 1847:99-105].

At the same time that steamboat traffic flourished in the mid-nineteenth century, railroads began an ascendancy that would soon overtake the river-based trade and the stage coach lines. By 1847

St. Louis had established stage routes to Chicago; Vincennes, Indiana; Springfield, Salem, and Jackson, Illinois; and Jefferson City, Fayette, Independence, and Palmyra, Missouri (Anonymous 1847). The state began issuing charters for railroads in its 1836-1837 session. Charters were issued for 17 railroad lines and 11 turnpike lines, all of which would have linked to St. Louis; however, none of these initial legislative efforts came to fruition. The Hannibal & St. Joseph, chartered in 1847, was successfully incorporated but it ran across the northern part of the state. In 1849 the Pacific Railroad was chartered to cross Missouri from St. Louis, and its first train left St. Louis in 1852 (CRO 1995; Primm 1998), inaugurating a robust period of railroad-based commerce in the city.

By 1860 St. Louis had become the nation's eighth largest city, with an economy based on shipping and distribution, food processing, meatpacking, brewing, and distilling (Primm 1998:192-197). The Civil War brought economic disruption to St. Louis, although there was no military action in or near the city. The Union blockade of the lower Mississippi cut the city off from New Orleans, and when the war ended, the crippled southern economy had a negative effect on St. Louis's trade (CRO 1995).

4. The Victorian City and Street Car (1870 to 1900)

In the last decades of the nineteenth century, St. Louis held its position as a major transshipment center, both by river and by rail, for raw materials and finished goods, such as cotton, foodstuffs, tobacco, clothing, shoes, beer, and firebrick. Products as varied as chewing tobacco, farm equipment, lumber, flour, and furniture moved through the warehouse district and the levee.

The city's position as one of the nation's busiest railroad hubs received a major boost with the completion of Eads Bridge in 1874. Before the opening of Eads Bridge, railcars moved across the river between St. Louis and East St. Louis by ferry. Rail bridges had already been built across the Mississippi at Quincy, Illinois, and Davenport, Iowa. Chicago, with its superior rail connections, had gained ascendancy over St. Louis as a transportation hub, a fact that inspired a number of proposals for a rail bridge at St. Louis as early as 1836. With the realization that railroad commerce would dominate the late nineteenth century, and the collapse of Southern economy that resulted from effects of the Civil War blockade, plans to build a rail bridge across the Mississippi at St. Louis accelerated in the 1860s. Following a design developed by James B. Eads, the bridge was finally completed in 1874, featuring three 500-foot spans that supported a lower deck for rail traffic and an upper deck for vehicular traffic. Aside from the length of the spans—which were 200 feet longer than anything previously built—some of the engineering challenges included the great depth to bedrock, the great differences in elevation between the Illinois and Missouri sides of the river, the need to provide sufficient clearance for steamboat traffic, and the steep topography in St. Louis, which required construction of a 4,880-foot-long tunnel through the downtown area. Completion of the Eads Bridge allowed St. Louis to cling to its position as a major railroad transshipment point, second only to Chicago. Although the Eads Bridge was a major engineering achievement of its time and is recognized today as a National Historic Landmark, it quickly descended into bankruptcy and was eventually sold at public auction for a third of its original cost (Murphy 1984). The bridge became a local landmark, featured in picturesque views of St. Louis (e.g., Currier & Ives ca. 1874a), some of which portray the adjacent riverfront district that would later be encompassed by JEFF (Figure 10).

FIGURE 10: Detail of *The Bridge at St. Louis*, ca. 1874, Showing St. Louis Riverfront Area

SOURCE: Compton and Company c. 1874

With excellent steamboat and railroad connections, St. Louis's economy flourished in the late nineteenth century. The riverfront was packed with steamboat line offices, warehouses, and wharf docks. Some 18 railroads maintained offices or freight depots in the riverfront area in 1888 (Rippey 1888). The riverfront area continued as a major transshipment point for people, raw materials, and manufactured products, while new growth in the downtown area focused in the area west of Fourth Street.

By 1870 all of the blocks in the study area had been fully subdivided. The quarter- and half-block residential properties of the French village that allowed space for gardens and orchards had given way to blocks with continuous development along each street face. Each of the blocks in the study area contained an alley that gave access to the rear lot areas. In many cases buildings occupied the full length of the lot, extending the full distance from the street to the alley. In some instances the block interiors contained backlot courtyards. Other lots contained narrow walkways along the side boundaries. Streets widths in the study area had been expanded as wide as 60 feet along some sections of Main and Market streets, while others, such as Second Street, were less than 40 feet wide. The alleys ranged from 10 to 25 feet wide at the street openings. Lot sizes also varied dramatically. The smallest, with dimensions of about 20x60 feet, were likely residential or small commercial properties. The largest lots were 40 feet or more in width and extended the full length from the principal streets (First, Second, and Third) to the alleyways, up to 140 feet long. The largest lots were taken up by warehouses and light industries such as printing and bookbinding. Despite the intensifying pattern of land use, the neighborhood retained a residential element, as it was necessary to maintain proximity of workplace and homeplace. Boardinghouses provided living space for the workforce that found employment in the warehouses and industries that flourished along the riverfront. This pattern of mixed use persisted until the advent of streetcars and the automobile allowed the development of suburban residential communities. Figures 11-15 portray the development of the study area from the 1870s through the end of the nineteenth century.

5. The World's Fair City and the Automobile (1904 to 1940)

St. Louis reached a peak of fortune and glory in 1904 by hosting the Louisiana Purchase Exposition, also known as the World's Fair. The fair provided motivation to beautify the city, which manifested in municipal services such as trash collection, improvements in the public water supply, improvements to streets, creation of a park commission, and zoning of separate residential and industrial areas. Establishing a permanent city planning commission in 1911 led to, among other things, plans for improvements to the riverfront district, which had become a decaying warehouse district. The age of the automobile allowed development of residential areas outside the downtown area, and the growth of new shopping areas left the riverfront area lifeless. Although the City Planning Commission and local civic leaders developed various plans for revitalization of the riverfront area between 1907 and 1937, the area continued to decline, and many local enterprises never recovered from the Great Depression (CRO 1995).

Sanborn maps from 1903 to 1932 trace the decline of the study area (Figures 16 and 17). Of note are many properties marked "vacant" on the 1932 atlas. Of the 11 vacant properties in the study area, six are located in Block 32, two in Block 33, two in Block 59, and one in Block 85. Decay had led to outright demolition in at least one case: nine properties in the northwest corner of

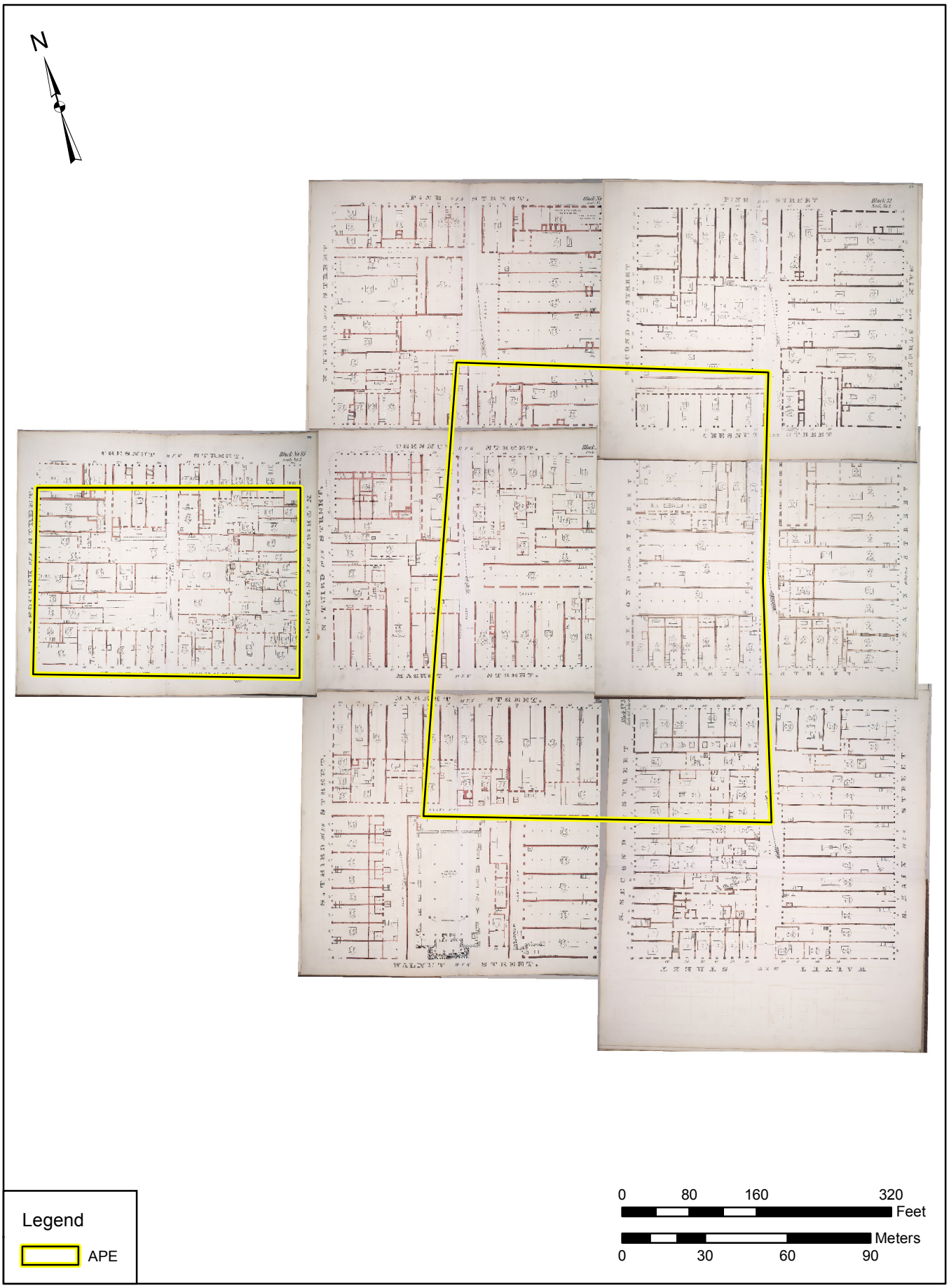


FIGURE 11: Study Area in 1870

SOURCE: Whipple 1870

FIGURE 12: Detail of *The City of St. Louis, as Seen from above the Mississippi River*

SOURCE: Currier & Ives 1874b

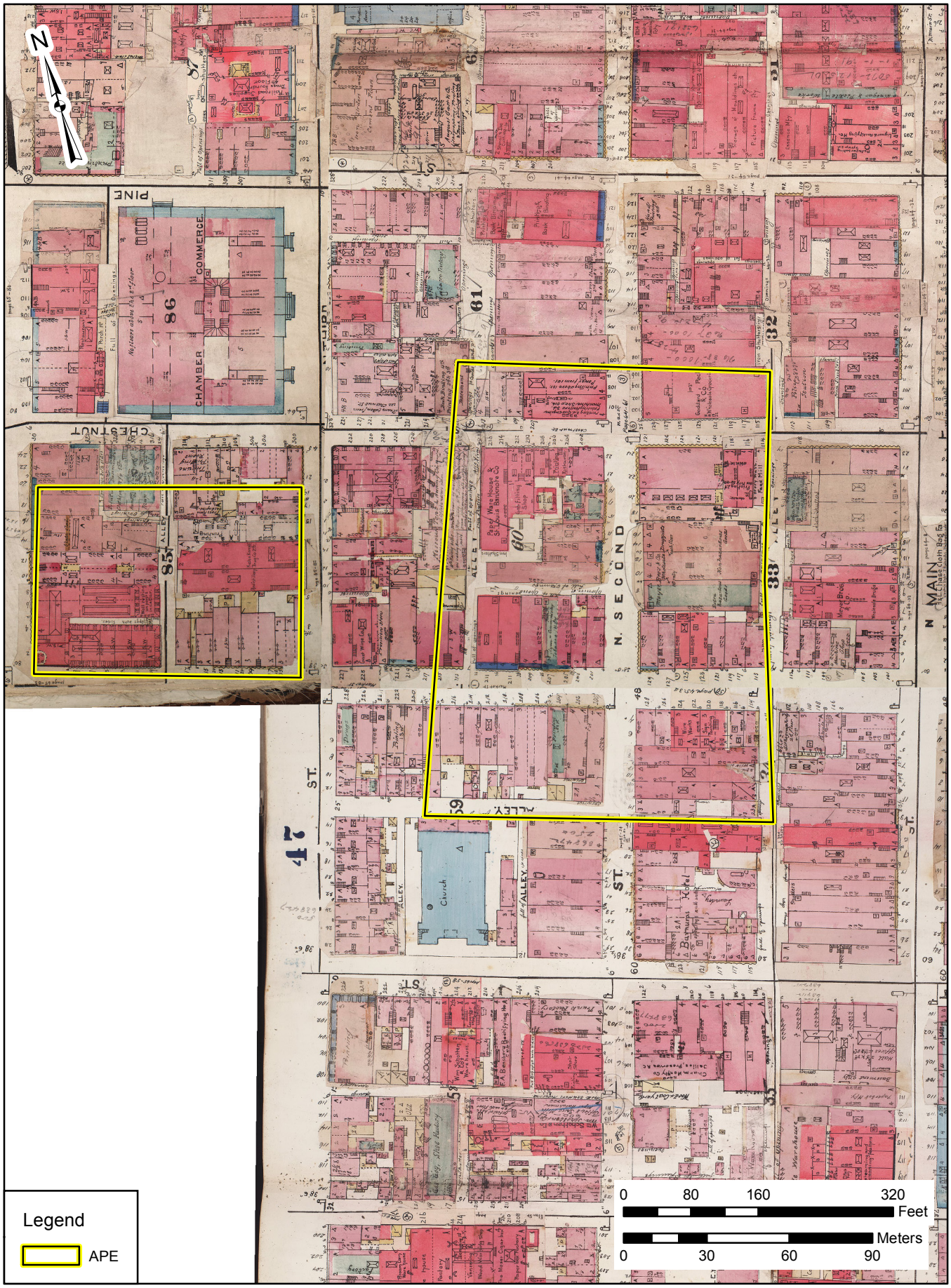


FIGURE 13: Study Area in 1876

SOURCE: Whipple 1876

FIGURE 14: Detail of *Pictorial St. Louis, The Great Metropolis of the Mississippi Valley, A Topographical Survey Drawn in Perspective*

SOURCE: Dry 1876

FIGURE 15: Study Area in 1897

SOURCE: Whipple 1897

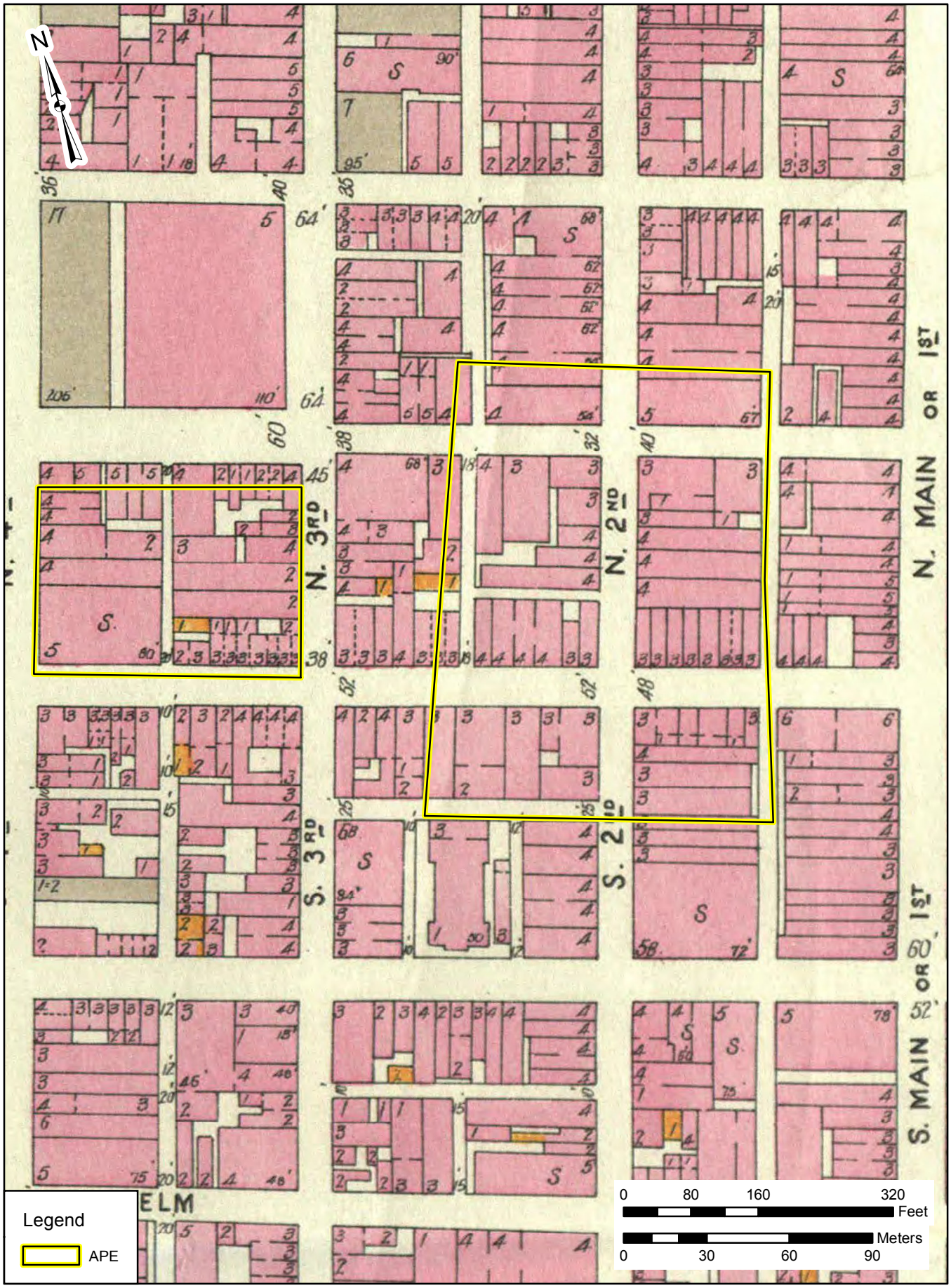


FIGURE 16: Study Area in 1907

SOURCE: Sanborn 1907

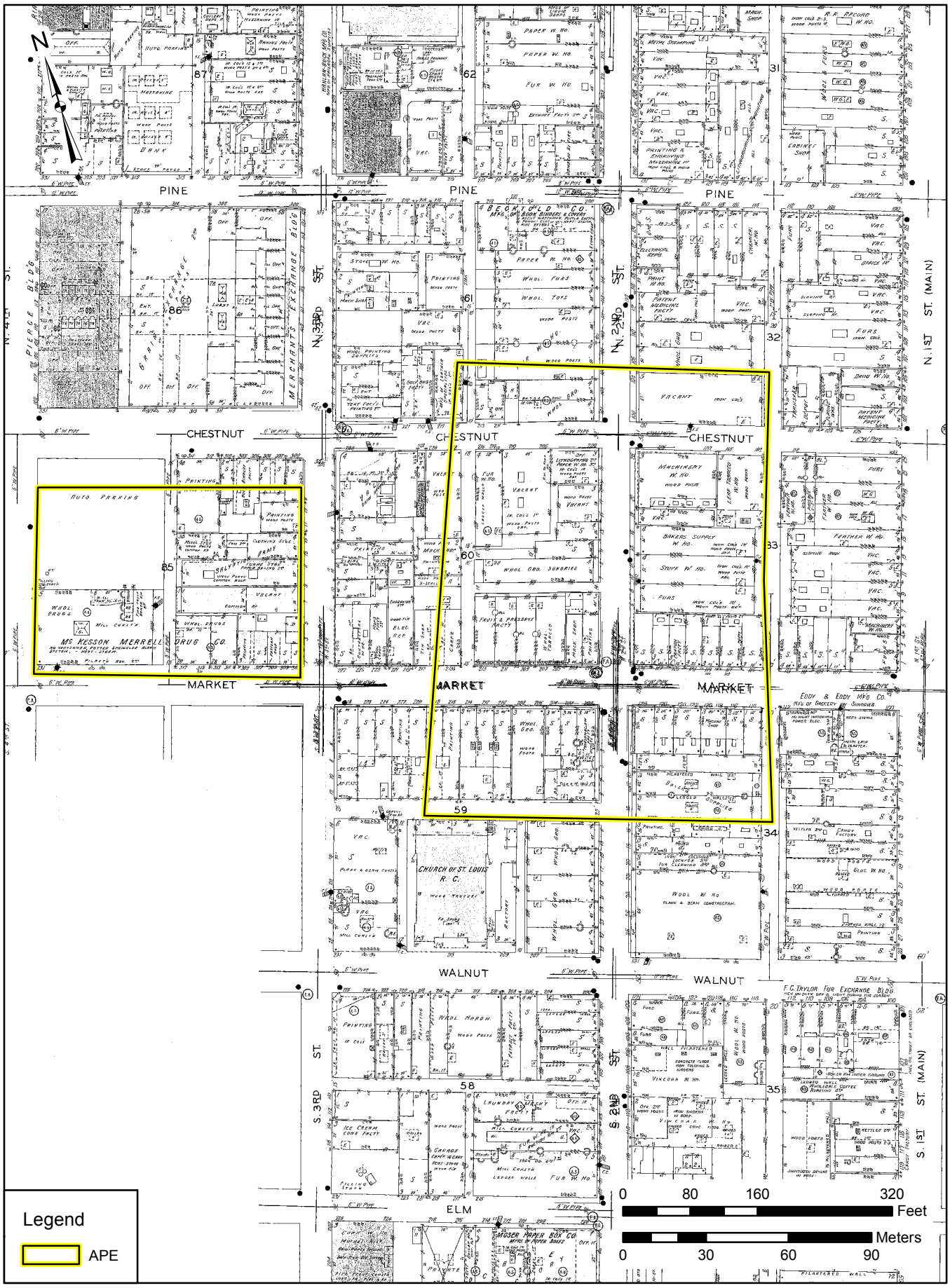


FIGURE 17: Study Area in 1932

SOURCE: Sanborn 1932

Square 85 (now Luther Ely Smith Square) had been leveled and converted to automobile parking. Also of peculiar note is the survival of fur warehouses, which trace a commercial ancestry from the trading post established by Pierre Laclède and Auguste Chouteau in 1764. Four fur warehouses are shown in the study area on the 1932 Sanborn map: one on Pine Street (Block 32), two on Main Street (Blocks 32 and 33), and one on Second Street (Block 33). Vacant properties can be seen in a 1930s-era view along the riverfront (Figure 18).

6. Creation of a National Monument

Development of JEFF had its roots in early twentieth-century efforts to revitalize the riverfront area, which by then had become an aging warehouse district. Led by local lawyer Luther Ely Smith, the Jefferson National Expansion Memorial Association was formed in 1934, with the intent to revitalize the riverfront, stimulate the local economy, and create jobs. Congress then created the United States Territorial Expansion Commission to design and build a permanent memorial, establishing the site boundary to include an 85-acre area along the waterfront south of Eads Bridge. The commission formally defined the historical significance of the memorial and provided for a design competition (AECOM 2010; Bellavia 1996).

Land acquisition and condemnation began in 1937, and by 1942 only a few buildings remained extant: the Old Courthouse, the Old Cathedral, and the Denchar Warehouse (Figure 19). The 1948 topographic survey portrays the park at this stage of development; the land had been cleared and the grade returned to the pre-existing street grades along First, Second, and Third streets as well a as few of the cross streets (Figure 20). A two-stage design competition was held in 1947-1948, culminating in the selection of Eero Saarinen's design that featured a naturalistic, park-like setting. The physical development of site would be postponed for decades while the issues pertaining to funding and relocation of the elevated railroad that ran along the levee remained unresolved. Funding construction of the memorial would not be forthcoming without a clear resolution of the railroad issue because Saarinen's original design required relocation of the railroad to the west and concealing them in a tunnel. The engineering and cost associated with this idea was unacceptable to the Terminal Railroad Association (TRRA), and Saarinen ultimately had to compromise, agreeing to a solution that would move the railroad some 105 feet to the west and conceal it in a series of tunnels and cuts.

The first tract to be developed was Luther Ely Smith Square (Block 85, bounded by Market, Chestnut, Third, and Fourth streets), which was formally landscaped in 1951. Development of the grounds east of Third Street was delayed until the 1960s, pending resolution of design and funding issues. As these were negotiated, the major portion of the park was used primarily as a parking lot, which was routinely used by more than 3,000 people. To facilitate parking, some 380,000 cubic yards of fill were brought into the site. The 1957 topographic survey of the park shows some development in the southern end of the park, including parking areas, Der Biergarden, a hospital, and various paved areas of unidentified function (Figure 21).

Following a 1957 agreement concerning the relocation of the railroad tracks, site work began with shifting the tracks. Under Saarinen's modified design the tracks were placed in a 960-foot tunnel immediately in front of the arch and passed through a series of open cuts and a tunnel in the rest of the site, a solution that was far less costly than a single tunnel running the entire length

FIGURE 18: View Along Riverfront, 1930s *SOURCE: Moore 2005:13*

FIGURE 19: Site Conditions After Land Clearance, ca. 1942 *SOURCE: Moore 2005:23*

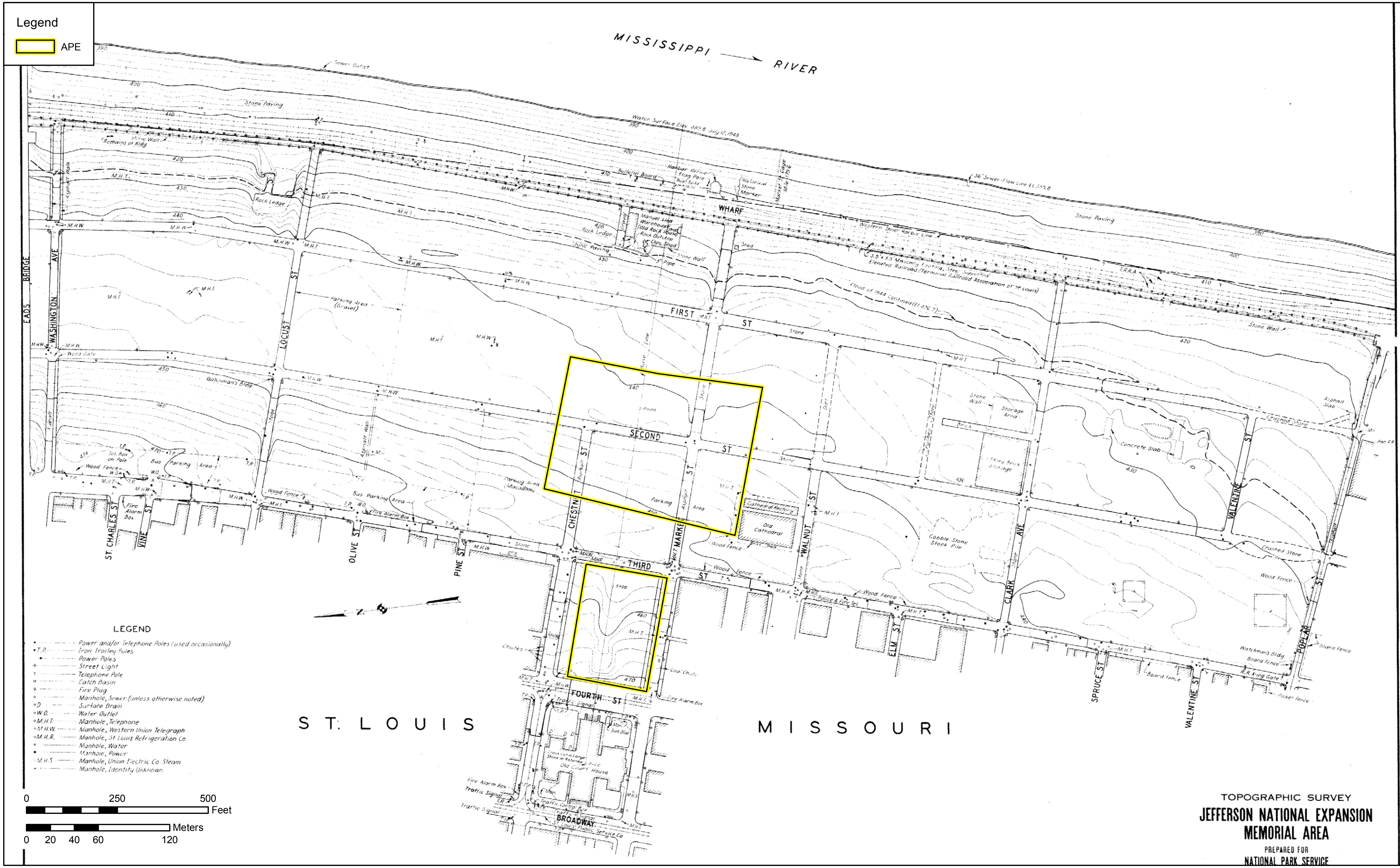


FIGURE 20: Site Conditions, 1948

SOURCE: USACE 1948

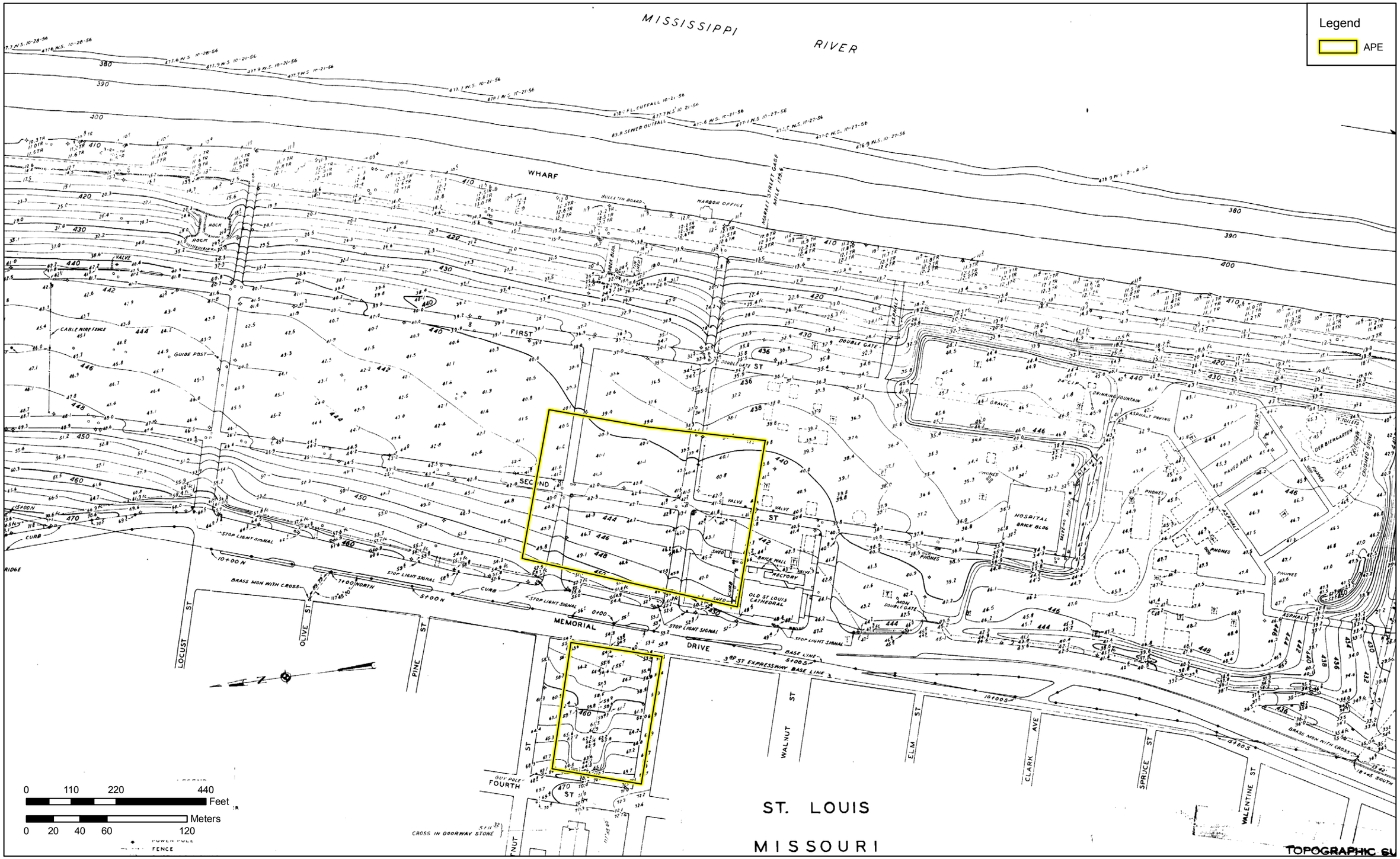


FIGURE 21: Site Conditions, 1957

SOURCE: USACE 1957

of the park. By 1962 major alterations of the landscape had occurred, including the railroad relocation and excavations for the arch foundations. All remnants of the original street grid had been obliterated, as shown on a topographic survey (Figure 22). Another accommodation of the transportation infrastructure was construction of the Third Street Expressway (now I-70), which began in 1963 and cut along the western edge of the park land, separating the Old Courthouse and Luther Ely Smith Square from the grounds surrounding the arch. The expressway is now at a depressed grade, preserving views between the river and the Old Courthouse.

Construction of the arch was completed in 1965 and this was followed by development of the grounds. The landscaping was completed in phases, from 1969-1973 and from 1979-1981. The grand staircase, another major element of the design, was completed in 1976. The parking garage at the north end of the park was completed in 1986 (AECOM 2010; Bellavia 1996).

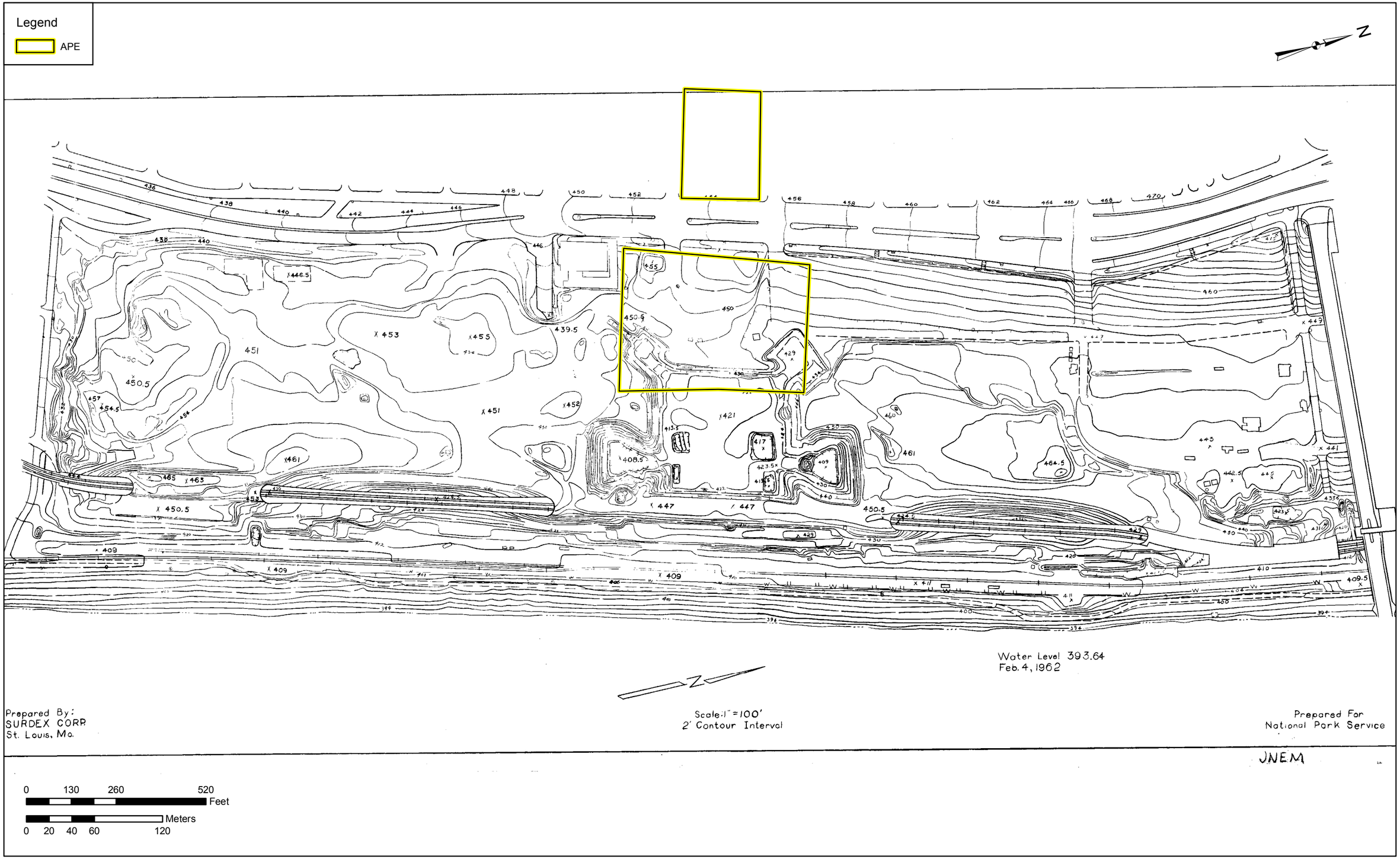


FIGURE 22: Site Conditions, 1962

SOURCE: Surdex Corp1962

V. RESULTS OF GEOARCHEOLOGICAL TESTING

In all, 36 cores were extracted: 20 cores from Subarea 1, seven cores from Subarea 2 (Luther Ely Square), and nine cores from Subarea 3. The locations of the cores are shown in Figure 23, and a summary of the coring results is provided in Table 6. Detailed logs of each core are provided in Appendix A. As expected, the upper deposits in the soil columns were dominated by anthropogenic deposits (fills), presumably indicative of the mid-twentieth-century processes of urban renewal that led to creation of the formal landscapes that surround the Gateway Arch. These fills typically contain brick, concrete, and limestone, which were common building materials for structures that were built and remodeled in the nineteenth and twentieth centuries.

The cores were advanced to an average depth of 26.5 feet below ground surface (bgs). Only one core (8A) could not be advanced beyond 10 feet bgs, owing to a concrete obstruction. The average depth of fill was 16.2 feet bgs. Seven cores were advanced to bedrock, which was reached at depths ranging from 28 to 55 feet bgs.

Although about 44 percent of the cores did not penetrate through historic fill (16 of 34), the geologic cores generally indicate that the native A-horizon, which was the occupation surface for prehistoric groups, historic-period Native American tribes, and early historic-period settlers in the study area, has been completely removed. Only Pleistocene deposits were evident under fill in the cores. These subsoil deposits included strata deposited after the glaciers retreated from the area some 12,000 years ago and include sediments provisionally identified as loess and glaciofluvial and glaciolacustrine deposits.

A. SUB AREA 1

Twenty cores were placed in Sub Area 1, the largest of the areas tested. For the most part the core locations were chosen to sample open streets and alleyways, such as the historical alignments of Market Street (Cores 8 and 11), Chestnut Street (Cores 20 and 22), Second Street (Cores 23, 24, 25, and 26), and the alley that bisected Block 60 between Market and Chestnut Streets (Cores 13, 14, 15, 16, 17, 18, and 19). A few others were placed in rear lot areas that apparently remained open at least until 1932 (Cores 20, 21, and 22). The average depth of fill deposits in Sub Area 1 was 19.8 feet, and the depths probably underestimate the true depth of disturbed soils, as some of the cores were terminated at impenetrable concrete or limestone in fill (Cores 8A, 8B, 12, 16, 18, 18, 19, 20, 23, 25, 26, 27, and 28). Drilling was advanced to bedrock in Core 11 (55 feet bgs), Core 22 (37.5 feet bgs), and Core 24 (35 feet bgs).

B. SUB AREA 2

Seven locations were tested in Sub Area 2, which corresponds to Luther Ely Smith Square. Three were placed along the alley that opened through Block 85 (Cores 1, 2, and 5), running between Chestnut and Market streets, and two were placed in open backlot areas in the northeast (Core 4) and southeast corners (Core 3) of the block. One core was placed in the northwest quadrant of the block (Core 6), over an area that had been razed prior to 1932 and had been used at that time as a parking lot. Perhaps as expected, both attempts at the Core 6A and 6B locations met refusal

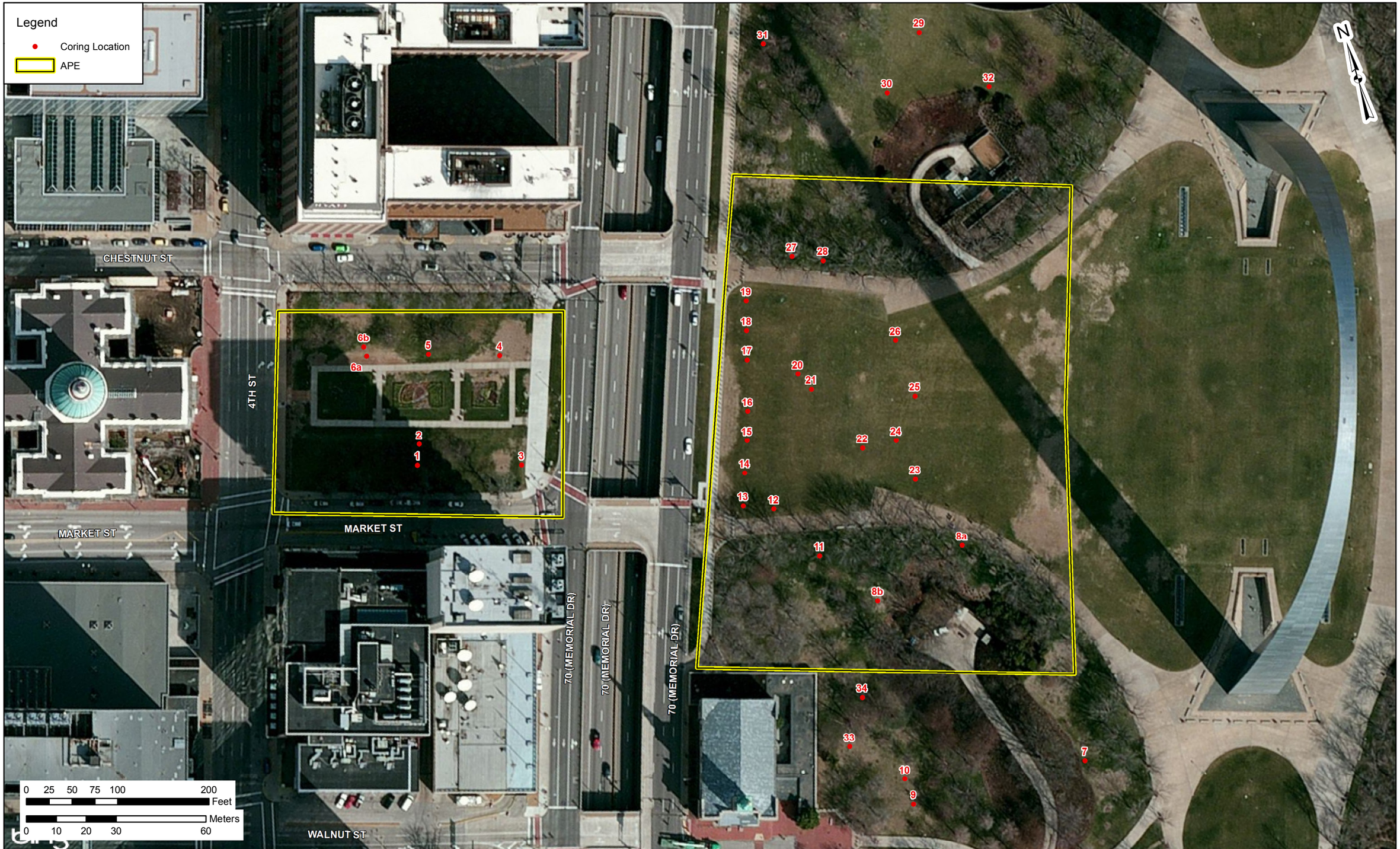


FIGURE 23: Location of Cores

SOURCE: ESRI Bing Maps Aerial 2012

at a somewhat shallow depth (10 feet), as this area of the block had been fully built out historically.

The loose fills with cinder, coal, ash, and brick rubble in Cores 6A and 6B would be indicative of a deep basement holding the remains of an imploded building. The remaining five cores in the open areas all reached depths of 20 feet bgs or more, with fill soils in most cores generally ranging in depth from 4.7 to 8 feet bgs. Core 5 is notable in that a truncated Bt-horizon was identified at 0.8 feet bgs. Approximately 2.1 feet of this Bt-horizon is preserved, and comparison with typical soil profiles in the region indicates that Bt-horizons formed in silty parent material (loess) on upland locales that range from 2 to 6 feet in thickness (USDA-NRCS 2012). It suggests that between 1 and 4 feet of the upper profile of the Bt-horizon has been removed by development. Core 5 was the only location where soil weathering consistent with a position in the upper portion of the soil could be identified.

C. Sub Area 3

Nine core locations were investigated in Sub Area 3, which included areas directly north and south of Sub Area 1. As in Sub Area 2, the sample locations focused on historically open streets and alleys where it was anticipated that remnants of the early historic or prehistoric landscape surface might have survived. Cores in the northern part of Sub Area 3 (Cores 29, 30, 31, and 32) were laid out to intercept Second Street (Cores 29 and 30), the alley in Block 61 (Core 31), and an interior area of Block 32 (Core 32). In the southern area cores were placed to sample Second Street (Cores 9 and 10) and the alley in Block 34 (Core 7). As it became apparent after several days of drilling that intact natural landscape surfaces had been quite thoroughly obliterated, a few final locations (Cores 33 and 34) were chosen near the Old Cathedral. The reasoning for this was that the Old Cathedral, which dates to 1834, is the only surviving remnant of the nineteenth-century landscape, so the nearby areas might also contain some remnant of that landscape. Cores 33 and 34 sampled the area immediately east of the cathedral (the interior of Block 59), but in both cases urban demolition fills at least 16 feet thick were present atop truncated Pleistocene sediments. The depth of fill in these locations relative to the elevation of the church indicates that the nineteenth-century landscape in this area has been disturbed to a significant depth.

As in Sub Area 1, deep fill deposits were the norm, with an average depth of 15.9 feet bgs. Two of the cores met refusal by concrete. Drilling was advanced to bedrock in four cores (Cores 29, 30, 32, and 33), reaching from 28 feet bgs (Core 29) to 33.3 feet bgs (Core 33).

D. Summary and Interpretation of Stratigraphy

The cores ranged in depth from 10 feet to 55 feet bgs; the deepest absolute elevation obtained was 403 feet amsl, or approximately 20 feet above the median water level in the Mississippi River (USGS 2012). Bedrock was encountered in at least 10 of the cores, at elevations between 422 and 403 feet amsl. Two additional cores, 27 and 28, may have encountered bedrock at 446 feet amsl, but because anthropogenic fills extended down to this depth, it is not clear if the obstruction that terminated the core was actually bedrock.

TABLE 6

SUMMARY OF CORING RESULTS

CORE NO.	SURFACE ELEVATION (ft amsl)	MAX. DEPTH OF CORE (ft)	DEPTH OF FILL (ft)	REMARKS
			Sub Area 1	
8A	452	4.0	4.0	Placed along Market Street; shallow to refusal with poor recovery; refusal at 4 ft by concrete.
8B	450	14.0	14.0	Offset 62 feet (19 meters) south of Core 8A, placed along Second Street; dark gray fill with abundant concrete; refusal at 14 ft by concrete.
11	458	55.0	20.0	Placed along Market Street; mixed fills, concrete and brick rubble 8 to 10 feet; refusal at 55 ft by bedrock.
12	456	26.0	26.0	Placed along Market Street; deep fills, compact to 13 feet, poor recovery of brick and concrete 15 to 26 feet; refusal at 26 ft by brick and concrete.
13	453	44 0	16.8	Placed in alley; stratified fills 2-4 feet thick, cinder layer at base of fill; core terminated at 44 ft in silt/silty clay.
14	454	36.0	18.0	Placed in alley; clean fill 7-12 feet, lower 5 ft of fill brick and concrete; core terminated at 32 ft in sand.
15	454	32.0	10.6	Placed in alley; mixed fills, brick and concrete throughout; core terminated at 32 ft in silt.
16	454	16.0	16.0	Placed in alley; mixed fills, demolition rubble 10-16 ft, possible basement; refusal at 16 ft by concrete.
17	455	33.0	18.7	Placed in alley; demolition rubble from 12-18 feet; refusal at 33 ft by rock.
18	455	12.0	12.0	Placed in alley; mixed fills to 8 ft, clinker layers at 8 and 12 ft, clean fill between; refusal at 12 ft by concrete.
19	455	32.5	32.5	Placed in alley; mixed fills to 10 ft, primarily brick rubble from 16.5 ft to base of fill; refusal at 32.5 ft by concrete.
20	459	29.0	29.0	Placed in open interior area; deep mixed fills, refusal at 29 ft by concrete.
21	460	38.0	33.3	Placed in open interior area; mixed fills with concrete, clinkers and sand to 33 .3 ft; refusal on rock at base of sand deposits at 38 ft.
22	461	37.5	21.4	Placed in open interior area; mixed fills to 15.5 ft, lenses of clean fill and clinker/rubble layers to 21.4 ft; refusal at 37.5 ft by bedrock.
23	458	22.0	22.0	Placed along Second Street; mixed fill with abundant brick, limestone gravel, and concrete to refusal at 22.0 ft by concrete.
24	459	35.0	31.3	Placed along Second Street; mixed fill to 22.6 ft, poor recovery of primarily demolition rubble to 31.3 ft; refusal at 35 ft by bedrock.
25	456	19.0	19.0	Placed along Second Street; mixed fills with abundant rock; refusal at 19 ft by limestone in fill.
26	459	23.0	23.0	Placed along Second Street; two fill episodes to 15.5 and 23 ft, respectively; refusal at 23 ft by concrete.
27	458	12.0	12.0	Placed along Chestnut Street; mixed fills with discrete lenses of rock, cinder or brick throughout; refusal at 12 ft by limestone in fill.

TABLE 6 (continued)

CORE NO.	SURFACE ELEVATION (ft amsl)	MAX. DEPTH OF CORE (ft)	DEPTH OF FILL (ft)	REMARKS
28	460	14.0	14.0	Placed along Chestnut Street; mixed fills with discrete lenses of rock, cinder, or brick throughout; refusal at 14 ft by limestone in fill.
Sub Area 2				
1	462	20.0	5.1	Placed in alleyway; stratified fills silty and compact, brick rubble 1.5-1.8 ft; core terminated at 20 ft in silt.
2	462	32.0	5.1	Placed in alleyway; mixed clayey and loamy fills, organic staining at 4.5 ft; core terminated at 32 ft in silt/fine sand.
3	456	24.0	4.7	Placed in open area in southeast quadrant of block; stratified fills approx. 1.5 ft thick; core terminated at 24 ft in silt.
4	457	28.0	8.0	Placed in open area in northeast quadrant of block; mixed fills with brick and coal; core terminated at 28 ft in silt/silty clay.
5	460	32.0	0.8	Placed along historical alleyway; remnant of truncated upper soil profile (B-horizon) below shallow fill; terminated at 32 ft in silt.
6A	462	10.0	10.0	Abundant cinders and coal; refusal at 10 ft. in historic fill.
6B	464	10.0	10.0	Offset 10 feet (3 meters) north of Core 6A. Mostly concrete and coal with poor recovery; refusal at 10 ft by concrete.
Sub Area 3				
7	441	15.0	15.0	Placed along alley; deep, stratified fills 1-2 feet thick; refusal at 15 ft by concrete.
9	444	32.0	15.2	Placed along Second Street; mixed fills, possible concrete floor at 13.3 feet; core terminated at 32 ft in clay.
10	444	32.0	18.3	Placed along Second Street; abundant brick and concrete in mixed fills; core terminated at 32 ft in clay.
29	442	28.0	14.0	Placed along Second Street; clean fill from 5 to 8 ft over brick, rock, and concrete deposit with poor recovery; core refusal at 28 ft by bedrock.
30	447	39.0	18.2	Placed along Second Street; two discrete fill episodes over demolition rubble to 18.2 ft; 18.2 to 22.5 ft possibly intact sediments but with strong organic odor; refusal at 39 ft by bedrock.
31	460	18.0	18.0	Placed along alley; mixed fills to refusal at 18 ft by concrete, poor recovery below 13.8 ft.
32	442	28.5	10.4	Placed in open interior area; mixed fills above clinker layer at base; refusal at 28.5 ft by bedrock.
33	445	33.3	18.3	Placed near Old Cathedral; stratified lenses of clean fill and demolition rubble to 8 ft, poor recovery of demolition rubble to base of fill; refusal at 33.3 ft by bedrock.
34	446	42.0	18.3	Placed near Old Cathedral; clean fills to 10 ft, poor recovery of demolition rubble to base of fill; refusal at 42 ft by bedrock.

Anthropogenic fills were encountered in every core, extending to depths between 4.0 and 33.3 feet bgs, although Core 5, located in Sub Area 2, consisted of a truncated, near-surface soil profile with a lower B horizon present below 0.75 feet of topsoil fill. Otherwise fills were fairly deep, indicative of the truncation that occurs with intensive urban development. In the cores where the complete depth of the fill could be penetrated, fills ranged from 4.7 feet to 33.3 feet

bgs. Fills were generally shallow in Sub Area 2, 8 feet or less in depth with the exception of Cores 6A and 6B, both of which encountered refusal in fill at 10 feet bgs. Generally, very little information could be gleaned from the fills.

Where fills consisted primarily of soil and sample recovery was high, the results indicate that intentional filling and compaction occurred. Where recovery was low and materials recovered consisted primarily of building materials, it is likely the location represents a former structure that was collapsed in on itself, and these locations are almost certainly within the footprints of former structures, most of which probably had deep subsurface basements. Cores where the fill could not be penetrated are assumed to be within former footprints. In a few cases the fills appeared to be stratified, which may represent multiple cutting and filling episodes, although these are difficult to distinguish from fills that are deposited quickly but in "lifts," or layers that are compacted as they are placed. Cores that displayed relatively continuous profiles of soil and other materials that may have been emplaced periodically over time include Cores 1-5 in Sub Area 2, Cores 11, 15, and 22 in Sub Area 1, and Cores 7, 30, 31, and 32 in Sub Area 3.

Cross sections of the subsurface stratigraphy were developed from the coring results, running west to east from Sub Area 2 to Sub Area 1 and south to north through Sub Area 3 and Sub Area 1 (Figures 24 and 25). Although the vertical scale is exaggerated to show the stratigraphy in detail, the consistency across the study area confirms some of the interpretations made in the field. Two locations (Cores 2 and 22) in the west-to-east cross section indicate that the basal remnants of a soil profile developed in the loess and further demonstrate the extent that the historic cut-and-fill has truncated the profile to the depth of unweathered Pleistocene sediments. Loess deposits are underlain by variably textured glaciofluvial sands and silts, and are in turn underlain by another episode of silt deposition, possibly a truncated loess deposit. The south-to-north cross section is more difficult to correlate but generally shows a similar geological sequence: deep fill truncating loess, which in turn overlies glaciofluvial outwash and bedrock. One of the complicating factors in correlating the units across this transect through the study area is the depth to bedrock, which is significantly deeper north and south of Sub Area 1.

Deposits identified below artificial fills consisted of Pleistocene sediments, most notably wind-blown silts (loess) and water-borne sediments composed of silt, sand, and to a far lesser extent clay. Loess was deposited across the landscape during the Wisconsin period, with the silty parent material available in valley floors originating in flows of sediment-rich outwash originating along the glacial front to the north. Waterborne sediments observed in profiles are likely a combination of glaciofluvial and glaciolacustrine in nature; these typically underlie the loess, although in some cases interbedded sands and silts were found to overlie loess in a few areas, indicating that active alluviation by the ancestral Mississippi River occurred at times during the deposition of loess or subsequent to it.

Fluvial deposits occurring within or between loess deposits may signal alluvial events occurring between the two most recent episodes of loess deposition in the Mississippi Valley, the deposition of the Roxanna silt (ca. 60,000 to 30,000 years ago) followed by the most recent period of loess deposition, the Peoria Loess (ca. 25,000 to 12,000 years ago) (Forman and Pierson 2002). Although loess deposition was not constant, it did take place over a broad time scale, and the effects of alluvial (scouring and/or deposition) and colluvial (erosion and/or

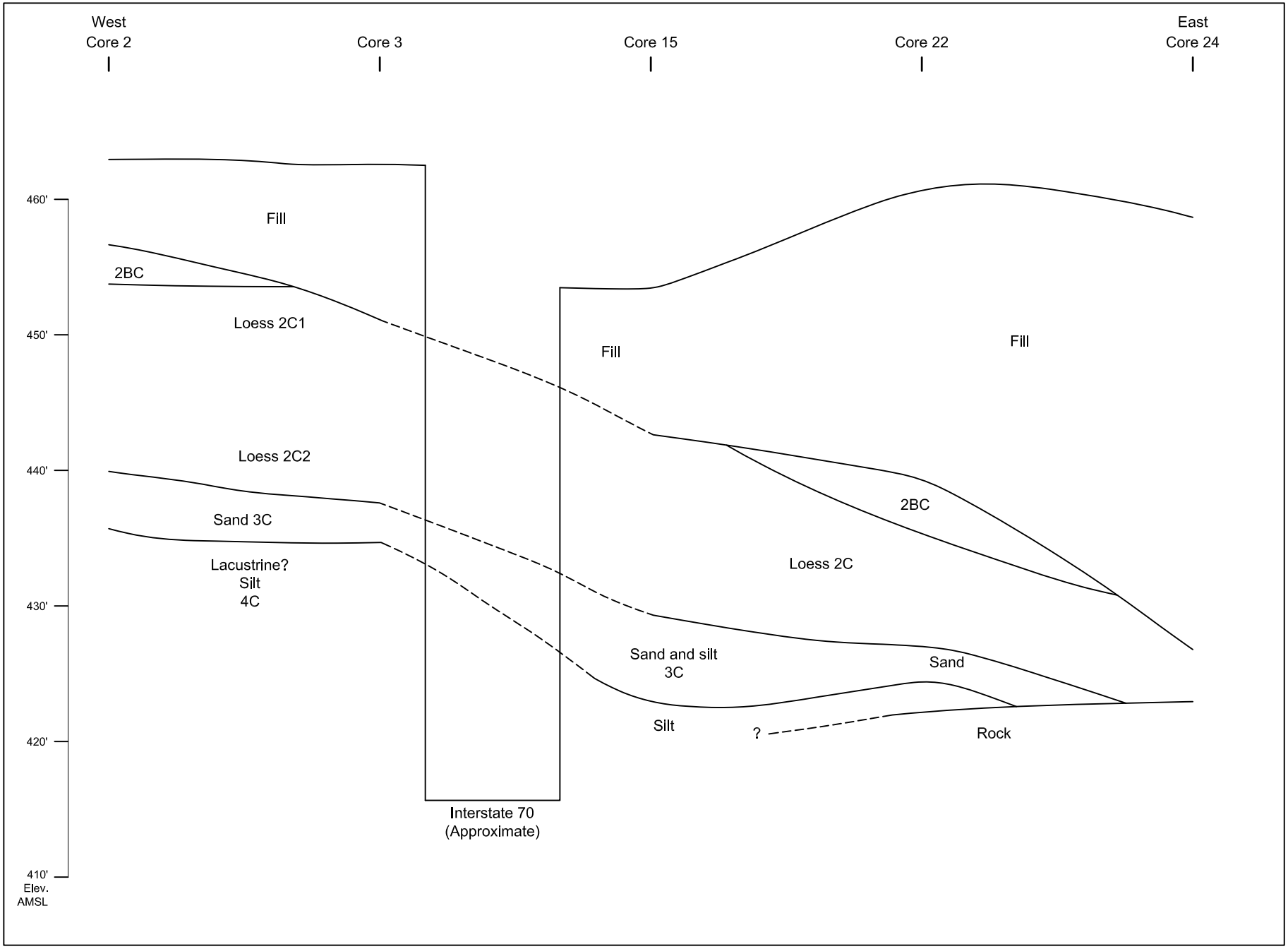


FIGURE 24: Reconstructed East-West Stratigraphic Profile

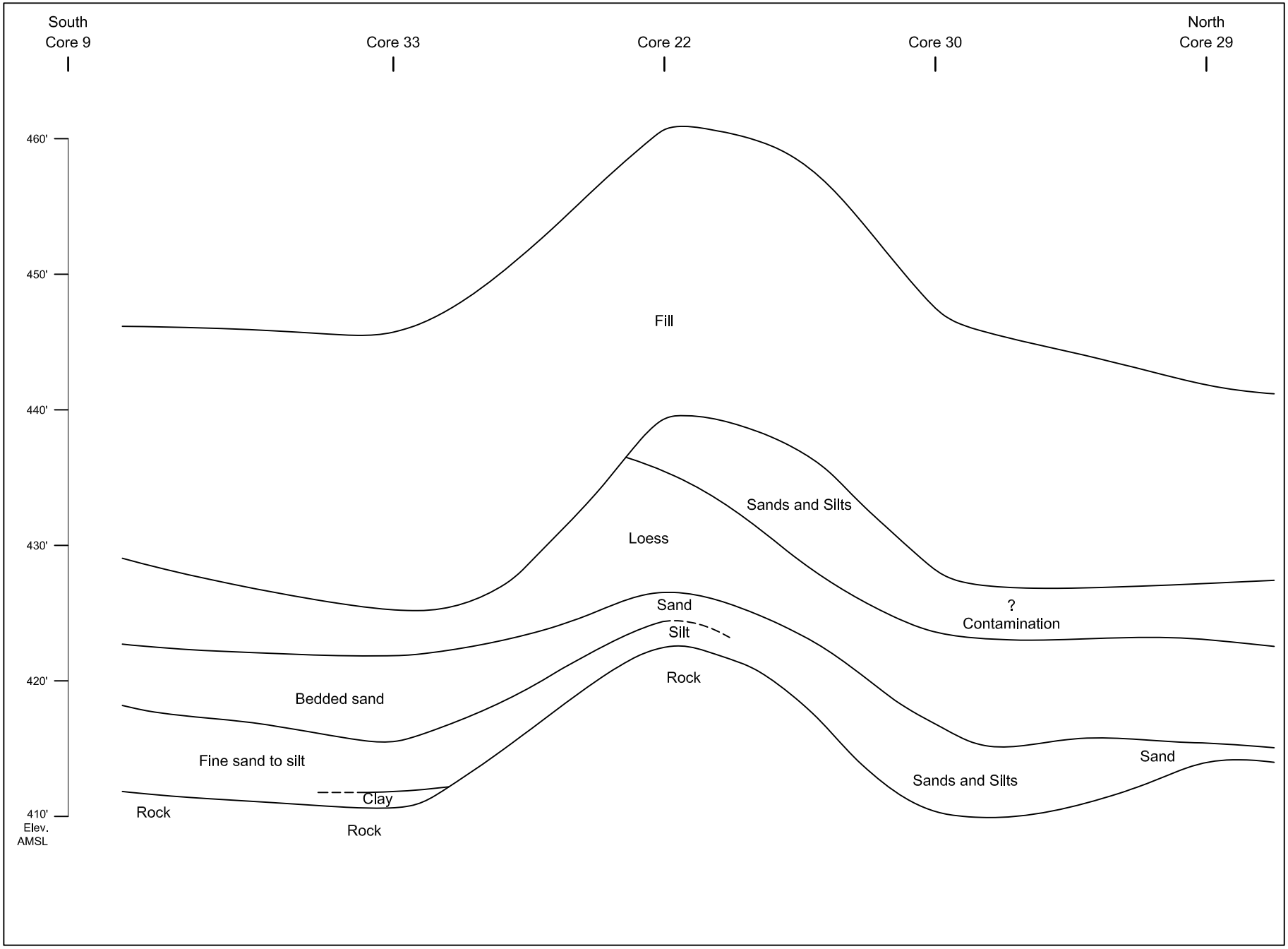


FIGURE 25: Reconstructed North-South Stratigraphic Profile

accumulation of eroded materials) processes are expected for a location so near to the river channel and on a sloping bedrock shelf adjacent to the channel. Historically documented floods have crested as high as the uppermost fluvial deposits located in the study area, rising to elevations of 429.5 feet in 1993 (USGS 2012), so there is a possibility that the fluvial deposits found underlying the fill and overlying loess in the vicinity of Cores 29, 30, and 32 are Holocene in age. However, loess deposited at higher elevations nearby indicates that this is unlikely, and the character of these sediments is consistent with the glaciofluvial deposits found below loess elsewhere in the study area. In any event these fluvial sands and silts are truncated by historic-period cut and fill, and there is no evidence that any stable, weathering soil surfaces are present in this deposit.

In areas away from active stream channels, loess deposits can occur in unbroken sequences, although the pace of deposition can be inferred from soil development. During times of slow or no loess accumulation, sediments are transformed into soils by pedogenic processes and leave evidence in the profile. The lack of soil development indicates that loess was deposited more quickly than pedogenesis could occur and results in massively bedded silts with no pedogenic structural development. Loess deposits dominate the stratigraphy and were encountered in every core where the base of anthropogenic fills could be penetrated. No pedogenic development was noted in any of the silts identified in cores at JEFF. The cores demonstrate that the loess profile is extensively truncated by historical development, and anything below the base of the fill in the massively bedded loess would likely be more than 15,000 to 20,000 years old and therefore would not have archeological potential.

The depth to bedrock indicates that the underlying limestone surface is irregular. The 1948 site mapping shows bedrock outcropping along the bank of the river at an elevation of 420 feet in at least two places (see Figure 17). This would be consistent with the depth to bedrock in Core 22, located roughly in the center of Sub Area 1, where it was found to lie at 423.5 feet. However, cores to the north and south in Sub Area 3 lie at depths between 10 and 19 feet below the outcroppings along the river, suggesting that the bedrock dips in places west of the riverbank. This dip would be more pronounced depending on the previous extent and elevation of the bedrock outcrops along the river, which have been quarried and/or cut to an unknown extent. Deposits overlying bedrock in Cores 10, 11, 34, and 35 indicate a previous waterway, infilled by fine-grained sediments likely deposited in a slackwater environment, that may be a former river channel that was cut off from the main river sometime before loess began accumulating at the site, at least 25,000 years ago. These fine-grained silts and clays may also represent sediments deposited during one or more glaciolacustrine episodes that occurred in the valley, when glacial ice dammed the river downstream of the site. Because the bedrock in these locations is capped by intact Pleistocene deposits, it is clear that the depth to bedrock in these locations has not been modified by historic-period quarrying or removal of material for building or use as fill material elsewhere. However, these irregularities are also likely to exist in the study area, possibly in the locations where the artificial fill could not be penetrated and the depth of bedrock is unknown.

As the highest absolute elevation of bedrock is located along the ridge that runs north-south through Sub Area 1, and bedrock is found at much lower depths to the north and south, the surface topography mapped in 1948, though mantled by deep fill, appears to mirror the subsurface bedrock topography to some extent, which is typical in loess-mantled landscapes. The

actual depth to bedrock at specific locations across much of the study area can only be estimated because of the data gaps created by cores that did not penetrate the historical fill and the unknown extent to which the bedrock in the area has been modified.

VI. ASSESSMENT OF ARCHEOLOGICAL RESOURCE POTENTIAL

The cultural landscape at JEFF has achieved its present form through a complex set of processes that culminated with the formal landscaping of the grounds that was carried out between 1957 and 1981. Underlying the formal urban landscape that provides a setting for the memorial arch, the natural landscape is still broadly evident in the topography that is defined by the sloping riverfront along the Mississippi River. The Mississippi River channel is the dominant feature of the natural landscape that would have been present during prehistoric and early historic times. The river itself, and its adjacent floodplains and terraces, was a vital resource for Native American hunter-gatherer and agricultural economies. Meat and pelts were obtained from animals living along the waterway. Fish and shellfish were harvested from the river. Groups traveled up and down the valley and on the river itself. With the subsequent arrival of Euro-American cultures, the river was used as a commercial waterway that allowed St. Louis to become a major metropolis.

Absent urban development, the study area might be expected to contain evidence of Native American use of the landscape, which could include physical remains of camps, villages, resource processing sites, or ceremonial areas, including burials. The archeological record of the metropolitan St. Louis area (Cahokia) certainly elevates the general potential for remains of Native American sites. Even in a heavily urbanized environment, one cannot completely discount the possibility for preservation of a Native American site in a micro-environment such as an open backlot, an alleyway, or a street that was historically maintained as an undeveloped right-of-way. Archeological properties associated with Native American cultures would vary in significance according to (1) integrity; (2) whether they represent a specific property type that is relatively infrequent, such as a Paleoindian camp; and (3) whether they can provide information on topics such as chronology, subsistence, community organization, or more specific research questions as defined in formal archeological resource management plans (e.g., Weston 1987). Isolated artifacts in a disturbed context would not be significant, but preserved and interpretable remains of a Native American site could add to regional knowledge of prehistoric cultures.

Archeological remains of the early trading village could likewise be highly significant, as no above-ground properties from that period have survived in the city. During the first decades of Euro-American settlement, St. Louis was thinly settled and most residential properties reflected traditional French creole building traditions, such as *poteaux en terre* or *poteaux sur sole* construction. Within the relatively large houselots of the early village, residential properties would also include outbuildings and special use areas, such as orchards, kitchen gardens, and trash disposal areas. With the rapid growth of the fur trade, more substantial brick and stone structures quickly replaced the dwellings that embodied French creole building traditions. As the city developed in the mid-nineteenth century, the riverfront had a mixed character, with residential properties crowded into smaller and smaller lots, and these residential properties often hosted multiple households or households that were extended by taking in boarders.

The most common physical remains associated with these residential properties could include architectural features associated with the dwelling house and outbuildings, such as stables, wells, privies (latrines), springhouses, or other special-purpose buildings. Activity areas associated with

domestic properties may include yards, trash dumps, and refuse deposits discarded by the occupant households. Specialized subterranean features, such as privy pits, wells, or cisterns, can be important for their associated refuse deposits. Such deposits would be archeologically significant to the extent that they embody information regarding consumer behavior and how this behavior varies according to factors such as gender, socioeconomic status, ethnicity, religion/ideology, household composition, household life cycle, income strategy, or participation in trade networks. Refuse deposits that accumulate on a yard surface are commonly described as sheet trash, yard refuse, or surface middens. Relative to feature deposits, yard surface deposits typically have lower integrity, poorly defined spatial boundaries, and are less easily associated with datable events or historically known households. Archeological remains of the early village would be expected to have low archeological visibility, as construction of more substantial structures would have obliterated remains of early residential occupation.

The three- and four-story commercial and industrial structures that dominated the riverfront area in the late nineteenth century would be reflected in the archeological record by architectural features such as foundations, machine mounts, floors, and subsurface utility lines such as sewer lines, drains and water pipes. Refuse deposits associated with the commercial and industrial sites could include material such as spent fuel (coal ash, slag) or industrial by-product, along with remains of workplace consumption patterns. Commercial and industrial sites seldom contain the rich, varied deposits of ceramics, bottles, and dietary refuse that are typically associated with domestic sites. But these sites may contain the occasional remains of the workingman's lunch, often represented by chicken bones and bottle assemblages that reveal the workplace consumption of alcoholic and non-alcoholic beverages or various medicinal and pharmaceutical products. Personal items lost or disposed of by workers may also be found.

The integrity of any earlier archeological remains would be affected by urban development beginning in the nineteenth century. The intensifying development of the St. Louis riverfront that occurred through the nineteenth century was marked by the expansion, reuse, and remodeling of pre-existing structures and an expansion of urban infrastructure such as sewers, water, gas, and electric lines. Commercial and industrial buildings often expanded to fill the entire lot from street to alley, leaving little or no open backlot space. The remains of earlier occupations would have been covered over with floors or obliterated by basement excavations. By the early twentieth century the riverfront had reached the point that it drew the attention of city planners who saw the need for urban renewal. New development in the riverfront had largely ceased, and some properties were demolished and converted to open parking lots.

Development of JEFF completely transformed the riverfront area, as some 38 blocks between Third Street and the levee were obliterated, save for the preservation of the Old Cathedral on Block 59 and one or two other structures that were ultimately removed. The process of urban redevelopment typically involves demolition of existing buildings by a process of implosion of rubble into cellars. This process leaves a barren landscape whose contours generally conform to the pre-existing street grades, as appears evident in the 1948 topographic survey of the park (see Figure 20) and a contemporary photograph (see Figure 19). The structural demolition process at JEFF was described as follows:

> The foundations of the buildings were left in place. All the masonry and non-degradable parts were put in the basements. If there was a slab in the basement of the building, the slabs were broken and actually pried up, so there were no pockets of water kept through the area. Only masonry-type refuse was permitted in the backfill, although I'm not naïve enough to think that's all that went in there, because we couldn't watch the work all over the place. In one case I remember there was a 4' by 4' safe just laying in the rubble. One Monday morning, in fact, it was gone. And they assured me that they had taken it away. I requested that they dig where the safe was, and sure enough they found it about two feet under the rubble [Gruber 2005]!

Luther Ely Smith Square (Block 85) was the first to be developed, and its landscaping was completed independently of the rest of the park. A photograph of the Old Courthouse (Figure 26), taken in the late 1930s from the square, seems to show the empty basements of buildings that had been razed along Fourth Street.

As late as 1957, much of the park land retained its overall general contours, and many of the street grades had been maintained (see Figure 21). After 1960 site development resulted in a much more severe reshaping of the landscape to accommodate the relocation of the railroad, excavations for foundations of the arch, and construction of other facilities. The contours shown on the 1962 topographic survey show a drastically altered landscape (see Figure 22). Construction-period photographs indicate the severity of the landscape modification. For example, the landscape immediately south of the Old Cathedral was downcut, leaving the structure almost pedestaled on a small remnant of the historical landscape (Figure 27). The 1960s-era grading in the central area of the park would have obliterated any archeological record of earlier times that could have miraculously survived the demolition campaign of 1942.

FIGURE 26: View from Luther Ely Smith Square, ca. 1935-1940 *SOURCE: JNEM Archives*

FIGURE 27: Site Conditions During Construction, 1962 *SOURCE: Moore 2005:63*

VII. CONCLUSION

The St. Louis riverfront area that was redeveloped for the construction of JEFF encompasses the earliest part of the city, including the original village laid out by Pierre Laclède and Auguste Chouteau in 1764, and this area was the heart of St. Louis economy in the early nineteenth century. The historical significance of this area gave promise that a rich archeological record might be preserved, beginning with Native American occupation along the bank of the Mississippi River.

The intensive urban development that occurred in the nineteenth century would have removed most, if not all, of any physical remains of Native American and early Euro-American occupation in the riverfront area, and in turn mid-twentieth-century urban redevelopment appears to have obliterated virtually all of the nineteenth-century commercial neighborhood. The land clearance that was completed in the 1940s, in anticipation of the national memorial, reduced a neighborhood of three-, four-, and five-story structures to a barren landscape but one that still retained remnants of the street grid that had been established in 1764. This is the landscape that former park archeologist Zorro Bradley saw in 1960, a landscape that still held some potential to contain sites that were important to the history of St. Louis. After final congressional approvals for funding and a viable agreement with the Terminal Railroad Association, construction of the memorial arch proceeded quickly, and by 1962 most remnants of archeologically significant landscapes had been removed. The final landscaping that was carried out from 1969 to 1973 and 1979 to 1981 may have further degraded the archeological record or simply rearranged recently deposited fills.

The geoarcheological testing program has documented the presence of deep fill deposits throughout the project APE, averaging more than 15 feet in depth. One exception was noted at Core 5, located in a historically open backlot area of Luther Ely Smith Square (Block 85). The fill deposits reflect the mid-twentieth-century (ca. 1937-1981) reshaping of an urban landscape that developed in the nineteenth century. These fills typically contain brick, concrete, and limestone, which were common building materials for structures that were built and remodeled in the nineteenth and twentieth centuries.

Natural soils and sediments identified at the base of the fills appear to be weathered from a parent material of loess. However, these loess deposits are of variable thickness, and the underlying lithostratigraphic units appear to be attributable to several different modes of deposition: glaciofluvial sediments from the ancestral Mississippi River, glaciolacustrine sediments laid down in lakes formed behind dams of glacial ice blocking the valley downstream, and possibly earlier periods of loess deposition. The upper loess unit identified seems to correlate to the Peoria silt, which covers much of the Midwestern United States and is thickest near the Missouri and Mississippi rivers (Grimley and Phillips 2011).

The archeological record at JEFF for the most part reflects events that occurred either (1) more than 12,000 years ago or (2) more recently than 1937. The record of Native American use of the landscape, the early settlement of St. Louis, and the vibrant nineteenth-century commercial district appear to have been destroyed in this area.

REFERENCES CITED

Adams, Brian
2004 *Phase I Archaeological Reconnaissance and Architectural Review for a Proposed Telecommunications Tower (Trileaf #5809) in St. Louis County, Missouri*. Prepared for the Trileaf Corporation, St. Louis, Missouri, by the Department of Anthropology, University of Illinois, Urbana.

AECOM, Inc.
2010 *Cultural Landscape Report, Jefferson National Expansion Memorial, St. Louis, Missouri.* Prepared for the National Park Service, Midwest Regional Office, Omaha, Nebraska, by AECOM, Charlottesville, Virginia.

Alex, Lynn M.
2000 *Iowa's Archaeological Past*. University of Iowa Press, Iowa City.

Aubin, C.T.
1874 *St. Louis Fire Insurance Maps.* Surveyed and drawn for the St. Louis Board of Fire Underwriters. On file, Washington University, St. Louis, Missouri.

Bailey, Garrick
2001 Osage. In the *Handbook of North American Indians*, edited by Raymond J. DeMallie, Volume 13, Part 1, pp. 476-496. William Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Bellavia, R.M.
1996 *Cultural Landscape Report for Jefferson National Expansion Memorial, St. Louis, Missouri.* National Park Service, Midwest Field Area, Great Plains Systems Support Office, Cultural Resources, Omaha, Nebraska.

Billon, Frederic L.
1886 *Annals of St. Louis in its Early Days under the French and Spanish Dominations.* G.I. Jones and Company, St. Louis.

1888 *Annals of St. Louis in Its Territorial Days from 1804 to 1821.* Printed by the author. Nixon-Jones Printing Company, St. Louis.

Brackenridge, H.M.
1814 *Views of Louisiana together with a Journal of a Voyage up the Missouri River in 1811.* Cramer, Spear and Eichbaum, Pittsburgh.

1817 *Views of Louisiana; Containing Geographical, Statistical and Historical Notices of That Vast and Important Portion of America.* Schaeffer & Maund, Baltimore.

Bradley, Zorro A.
1960 Memorandum to Superintendent, Jefferson National Expansion Memorial regarding Archeological Program, JNEM, dated November 4, 1960. On file, Jefferson National Expansion Memorial Archives, St. Louis.

1976 Memorandum to Supervisory Archeologist, Midwest Archeological Center Memorial regarding Raising Sleeping Dogs, dated April 19, 1976. On file, Jefferson National Expansion Memorial Archives, St. Louis.

Calvert, J.B.
2012 Old Units of Length. Engineering and Technology. Compiled by J.B. Calvert, associate professor emeritus of engineering, University of Denver. Accessed online 2012 at <http://mysite.du.edu/~jcalvert/tech/oldleng.htm>.

Cardarelli, François
2003 *Encyclopaedia of Scientific Units, Weights and Measures: Their SI Equivalents and Origins.* Springer, London.

Chapman, Carl H.
1975 *The Archaeology of Missouri I*. University of Missouri Press, Columbia.

1980 *The Archaeology of Missouri II*. University of Missouri Press, Columbia.

Clark, Peter U., Arthur S. Doyle, Jeremy D. Shakun, Anders E. Carlson, Jorie Clark, Barbara Wohlfarth, Jerry X. Mitrovica, Steven. W. Hostetler, A. Marshall McCabe
2009 The Last Glacial Maximum. *Science* 325(5941):710-714.

Compton & Co.
ca. 1874 *The Bridge at St. Louis.* Compton & Company St. Louis. On file, Prints and Photographs Division, Library of Congress, Washington, D.C.

Cultural Resources Office [CRO)]
1995 *A Preservation Plan for St. Louis.* Cultural Resources Office, Planning and Urban Design Agency, City of St. Louis, Missouri. Accessed online at The City of St. Louis Web site, September 10, 2012, at <http://stlouis-mo.gov/government/departments/planning/cultural-resources/preservation-plan/St-Louis-Preservation-Plan-TOC.cfm>.

Currier & Ives
ca. 1874a *The Great St. Louis Bridge, across the Mississippi River.* Currier & Ives, New York. On file, Geography and Maps Division, Library of Congress, Washington, D.C.

c. 1874b *The City of St. Louis, as Seen from above the Mississippi River.* Currier & Ives, New York. On file, Geography and Maps Division, Library of Congress, Washington, D.C.

Dry, Camille
1876 *Pictorial St. Louis, The Great Metropolis of the Mississippi Valley, A Topographical Survey Drawn in Perspective.* Compton and Company, St. Louis.

Environmental Systems Research Institute, Inc. [ESRI]
2012 Bing Maps Aerial imagery data layer. Worldwide orthographic aerial and satellite imagery. ESRI GIS and Mapping Software, Redlands, California. GIS Basemap imagery accessed November 2012 via ArcMap 10 (http://www.esri.com/software/arcgis/arcgisonline/bing-maps.html).

Forman, Steven L., and James Pierson
2002 Late Pleistocene Luminescence Chronology of Loess Deposition in the Missouri and Mississippi River Valleys. *Palaeogeography, Palaeoclimatology, Palaeoecology* 186(1):25-46.

Graf Engraving Co.
c1907 *The Heart of St. Louis.* Fred Graf Engraving Co., St. Louis. On file, Geography and Maps Division, Library of Congress, Washington, D.C.

Grimley, David A., and Andrew C. Phillips
2011 *Surficial Geology of St. Clair County, Illinois*. Illinois State Geological Survey, Rolla, Missouri. Accessed online at <www.isgs.illinois.edu/maps-data-pub/county-maps/pdf/st-clair-sg.pdf>.

Gruber, Howard
2005 Razing the Buildings in the Memorial Area. In *The Gateway Arch: An Architectural Dream*, p. 21. Jefferson National Parks Association, St. Louis.

Harl, Joseph
2006 *Data Recovery Investigations at the Cochran Gardens Hope VI Housing Development Tract, St. Louis, Missouri*. Prepared for KAI Build & Design, St. Louis, by the Archaeological Research Center of St. Louis, Inc., St. Louis.

Harrison, Richard W. (compiler)
1997 *Bedrock Geologic Map of the Saint Louis 30' X 60' Quadrangle, Missouri and Illinois.* Miscellaneous Investigations Series Map I-2533. United States Geological Survey, Denver, Colorado.

Hutuwa, Julius
1870 *City of St. Louis.* Julius Hutuwa, St. Louis. On file, Geography and Maps Division, Library of Congress, Washington, D.C.

Janicke & Co.
1859 *Our city, (St. Louis, Mo.).* A. Janicke & Co., St. Louis. On file, Geography and Maps Division, Library of Congress, Washington, D.C.

Juehne, Charles
1895 *St. Louis in 1895.* Charles Juehne. On file, Geography and Maps Division, Library of Congress, Washington, D.C.

K&K Environmental, LLC.
2005 *Cultural Resource Investigations, Phase I Cultural Resource Survey, GSS, Inc. Wireless Communications Project, "QO 5765 SE Downtown", St. Louis, Missouri*. Prepared for GSS, Inc., Urbandale, Iowa, by K&K Environmental, LLC., Leavenworth, Kansas.

2010a *National Historic Preservation Act (NHPA) Section 106 Archaeological/ Architectural Viewshed Investigations, GSS, Inc. Wireless Communications Project, Clearwire Century Building MOSTL0367, Roof-Mount Co-Location Site, St. Louis, Missouri*. Prepared for GSS, Inc., Urbandale, Iowa, by K&K Environmental, LLC., Leavenworth, Kansas.

2010b *National Historic Preservation Act (NHPA) Section 106 Archaeological/ Architectural Viewshed Investigations, GSS, Inc. Wireless Communications Project, Clearwire MOSTL0500, Roof-Mount Co-Location Site, St. Louis, Missouri*. Prepared for GSS, Inc., Urbandale, Iowa, by K&K Environmental, LLC., Leavenworth, Kansas.

2010c *National Historic Preservation Act (NHPA) Section 106 Archaeological / Architectural Viewshed Investigations, GSS, Inc. Wireless Communications Project, Clearwire 210 North Tucker, MOSTL5623, Roof-Mount Co-Location Site, St. Louis, Missouri.* Prepared for GSS, Inc., Urbandale, Iowa, by K&K Environmental, LLC., Leavenworth, Kansas.

Kaden, Scott, and Edith Starbuck
2008 *Surficial Material Geologic Map of the Granite City 7.5' Quadrangle, St. Louis City and County, Missouri (OFM-08-532-GS).* Missouri Department of Natural Resources, Division of Geology and Land Survey, Rolla.

Kay, Marvin
1979 On the Periphery: Hopewell Settlement in Central Missouri. In *Hopewell Archaeology*, edited by David Brose and N'omi Greger. Kent State University Press, Kent, Ohio.

1980 The Central Missouri Hopewell Settlement-Subsistence System. Research Series No. 15. Missouri Archaeological Society.

Kershaw, James M
1848 *Map and View of St. Louis, Mo.* J. M. Kershaw, St. Louis. On file, Geography and Maps Division, Library of Congress, Washington, D.C.

Kohn, Sophie
2011 Removal of Human Remains for Seven Coffin Burials from the Rutgers Graveyard (Site 23SL2324). Letter report submitted to Judith Deel, Historic Preservation Program, Department of Natural Resources, Jefferson City, Missouri, by Archaeological Research Center of St. Louis, June 27.

Lord, C.K.
1876 *Birds Eye View of St. Louis: Showing the New Line of the St. Louis, Kansas City & Northern Ry. Running into the Union Depot.* Woodward, Tiernan, and Hale, St. Louis. On file, Geography and Maps Division, Library of Congress, Washington, D.C.

McCarthy, John H.
1991 *Addendum to The Eads Bridge, MO-12.* Historic American Engineering Record, National Park Service, U.S. Department of the Interior, Washington, D.C.

McLaughlin, Meredith, and Valerie Altizer
2005 *Archival Evaluation of the Cochran Gardens Development Tract, St. Louis, Missouri*. Prepared for KAI Build & Design, St. Louis, by the Archaeological Research Center of St. Louis, Inc., St. Louis.

McLaughlin, Meredith, Janet Kneller, and Meredith Hawkins
2009 *Archaeological Assessment, Architectural Evaluation and Tunnel Documentation for the Tucker Boulevard Study Area, St. Louis City, Missouri.* Prepared for HDR by the Archaeological Research Center of St. Louis, Inc., St. Louis.

Martin, Terrel L.
1997 The Early Woodland Period in Missouri. *The Missouri Archaeologist* 58.

Meyer, Michael
2004 *Phase I Survey and Phase II Archaeological Investigations of the Walsh's Row Site (MoDOTST6), MoDOT Job No. J6I1667*. Missouri Department of Transportation, Jefferson City.

Meyer, Michael J., and David C. Austin
2008 *Below the Surface: Excavation of the Walsh Row Site (23SL2234), St. Louis, Missouri, MoDOT Job No. J6I1667*. Missouri Department of Transportation, Jefferson City.

Moore, Robert J., Jr.
2005 *The Gateway Arch: An Architectural Dream*. Jefferson National Parks Association, St. Louis.

Murphy, Kevin
1984 *The Eads Bridge, MO-12.* Historic American Engineering Record, National Park Service, U.S. Department of the Interior, Washington, D.C.

Naglich, Dennis, and Joseph L. Harl
1995 *Salvage Investigations of Cultural Resources at the New United States Federal Courthouse Site (23SL976), City of St. Louis, Missouri.* Prepared for the United States General Services Administration and CRSS Constructors by the Archaeological Research Center of St. Louis, St. Louis.

National Park Service [NPS]
n.d. *Site Grading, Jefferson National Expansion Memorial.* Drawing No. 366/41019. U.S. Department of the Interior, National Park Service, Denver Service Center. On file, Jefferson National Expansion Memorial Archives, St. Louis.

1965 *Proposed Grading Plan. Jefferson National Expansion Memorial.* On file, Jefferson National Expansion Memorial Archives, St. Louis.

1977 *Site Grading, Jefferson National Expansion Memorial.* Drawing No. 366/41037. U.S. Department of the Interior, National Park Service, Denver Service Center. On file, Jefferson National Expansion Memorial Archives, St. Louis.

2009 Orthoimagery of the Jefferson National Expansion Memorial.

O'Brien, Michael J., and W. Raymond Wood
1998 *The Prehistory of Missouri.* University of Missouri Press, Columbia.

Ortega, Richard I.
1976 Jefferson National Expansion Memorial. National Register of Historic Places Inventory-Nomination Form. On file, U.S. Department of the Interior, National Park Service, Washington, D.C.

Pearce, Justin T., and John N. Baldwin
2005 *Liquefaction Susceptibility Mapping, St Louis, Missouri and Illinois*. Prepared for William Lettis and Associates, Walnut Creek, California. USGS National Earthquake Hazards Reduction Program Award 03HQGR0029.

Peale, Titian R.
1862 Ancient Mounds at St. Louis, Missouri, in 1819. In *Annual Report, Board of Regents of the Smithsonian Institution for the Year 1861,* pp. 386-391. Smithsonian Institution, Washington, D.C.

Phillips, A., D. Grimley, and S. Lepley
2001 *Granite City Surficial Geology Map*. Illinois State Geological Survey, Rolla Missouri. Accessed online at <www.isgs.illinois.edu/maps-data-pub/county-maps/pdf/st-clair-sg.pdf>.

Pitzman's Co. of Surveyors & Engineers.
1960 General Survey. Drawing No. NHS-JNEM/3073. Prepared for Eero Saarinen and Associates Architects. On file, Jefferson National Expansion Memorial Archives, St. Louis.

Primm, James Neal
1998 *Lion of the Valley: St. Louis, Missouri, 1764-1980.* Third Edition. Missouri Historical Press, St. Louis.

Rippey, Joseph
1888 *Rippey's index Map and Business Guide of St. Louis, Mo.* No publisher listed.

Rogers, Leah D., and Ronald E. Pulcher
1987 *St. Louis Harbor Historic Properties Reconnaissance, City of St. Louis, Missouri*. St. Louis District Cultural Resource Management Report No. 31. Contact No. DACW43-84-D-0085, Delivery Order No. 8. Prepared for the U.S. Army Corps of Engineers, St. Louis District, by American Resources Group, Ltd., Carbondale, Illinois.

Sanborn Map Company
1903 *Insurance Maps of St. Louis, Missouri.* Sanborn Map Company, New York.

1907 *Insurance Maps of St. Louis, Missouri.* Sanborn Map Company, New York.

1908 *Insurance Maps of St. Louis, Missouri.* Sanborn Map Company, New York.

1909 *Insurance Maps of St. Louis, Missouri.* Sanborn Map Company, New York.

1932 *Insurance Maps of St. Louis, Missouri.* Sanborn Map Company, New York.

Scharf, J. Thomas
1883 *History of St. Louis and County, from the Earliest Periods to the Present Day, Including Biographical Sketches of Famous Men.* Louis H. Everts & Co., Philadelphia.

St. Louis Business Directory
1847 *St. Louis Business Directory for 1847: Containing the History of St. Louis from the Period of its First Settlement, Down to the Present Time.* Unknown publisher, St. Louis, Missouri.

Surdex Corp.
1962 Topographic Survey. On file, Jefferson National Expansion Memorial Archives, St. Louis.

The St. Louis Weekly Reveille
1849 Burnt District. May 28.

Tiffany, Joseph A.
1979 An Overview of Oneota Sites in Southeastern Iowa: A Perspective from the Ceramic Analysis of the Schmeiser Site 13DM101, Des Moines County, Iowa. *Proceedings of the Iowa Academy of Science* 86:89-101.

United States Army Corps of Engineers-St. Louis District [USACE]
1948 *Topographic Survey, Jefferson National Expansion Memorial Area.* Prepared for the National Park Service, Department of the Interior. On file, Jefferson National Expansion Memorial Archives, St. Louis.

1957 *Topographic Survey, Jefferson National Expansion Memorial Area.* Prepared for the National Park Service, Department of the Interior. On file, Jefferson National Expansion Memorial Archives, St. Louis.

United States Department of Agriculture-Natural Resources Conservation Service [USDA-NRCS]
2012 *Official Soils Series Description, Menfro Series*. Natural Resources Conservation Service, U.S. Department of Agriculture, Washington, D.C. Available online at <https://soilseries.sc.egov.usda.gov/OSD_Docs/M/MENFRO.html>.

United States Geological Survey [USGS]
1954a Cahokia, Illinois – Missouri. 7.5-Minute Series Topographic Quadrangle. Revised 1993. United States Geological Survey, Reston, Virginia.

1954b Granite City, Illinois – Missouri. 7.5-Minute Series Topographic Quadrangle. Revised 1993. United States Geological Survey, Reston, Virginia.

2012 *National Water Information System: Web Interface*, Gage 07010000 St. Louis. Accessed online November 27, 2012 at <http://waterdata.usgs.gov/usa/nwis/uv?07010000>.

Wayman, N.L.
1953 *Map of the Mississippi Country. Copy of a map of St. Louis village, ca 1804-05, now in possession of U.S. War Dept., Washington, D.C.* On file, Geography and Maps Division, Library of Congress, Washington, D.C.

Wells, Christy L., and Joyce A. Williams
1985 *A Report of Archeological Monitoring of Parking Facility Construction at the Jefferson National Expansion Memorial National Historic Site, National Park Service, St. Louis, Missouri.* Prepared for the U.S. Department of the Interior, National Park Service Bi-State Development Agency, by Department of Anthropology, Southern Illinois University, Edwardsville.

Weston, Donald E.
1987 Master Plan for Archaeological Resource Protection in Missouri. Edited by Michael S. Weichman. Historic Kansas City Foundation, Kansas City, Missouri.

Whipple [Oliver & Whipple]

1870 *Whipple's Insurance Maps.* On file, Washington University, St. Louis.

1876 *Oliver & Whipple Fire Insurance Map of St. Louis, Mo., 1876.* Two volumes. On file, Washington University, St. Louis.

1892 *Whipple's Fire Insurance Map of St. Louis, Mo., 1892.* Two volumes. On file, Washington University, St. Louis.

1897 *Whipple's Fire Insurance Map of St. Louis, Mo., 1897.* Three volumes. On file, Washington University, St. Louis.

Van Nest, Julieann

2002 The Good Earthworm: How Natural Processes Preserve Upland Archaic Archeological Sites of Western Illinois, U.S.A. *Geoarchaeology: An International Journal* 17(1):53-90. Wiley and Sons.

Appendix A

Coring Descriptions

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
1	462	0.33	0.10	U	10YR 3/2 Silt Loam; Minor roots; clean fill/topsoil
		1.50	0.46		10YR 5/4 silt loam, compact, coal & charcoal flecking at base
		1.83	0.56		Brick rubble
		4.00	1.22		10YR 5/4 silt loam, gravelly in upper 0.2 ft, compact
		5.08	1.55		10YR 5/3 Silty clay loam; abrupt
		8.00	2.44	2BC	10YR 6/6 Silt Loam, 10% 7.5YR 4/4 fine accumulations
		12.00	3.66	2B/C	10YR 6/6 Silt
		16.00	4.88	2C1	10YR 6/2 Silt, 7.5YR 4/4 fine accumulations below 14 ft
		20.00	6.10	2C2	10YR 6/2 Silt, 7.5YR 4/4 fine accumulations increasing in size with depth; base of core at 20.00 ft
2	462	0.75	0.23	U	10YR 3/2 Silt Loam; Minor roots; clean fill/topsoil
		1.25	0.38		10YR 5/6 Loam; gravels and concrete present
		2.75	0.84		10YR 5/6 Mixed clay loam fill; abrupt
		5.08	1.55		10YR 5/4 to 5/6 mixed clay loam fill; organic staining at 5.5 ft; abrupt
		8.00	2.44	2B/C	10YR 6/6 silt
		16.00	4.88	2C1	10YR 6/2 silt loam; 10YR 5/6 fine accumulations, becoming coarse mottles with depth; gradual
		21.83	6.65	2C2	10YR 6/2 silt clay loam; 10YR 5/6 coarse mottles
		25.58	7.80	3C	10YR 6/2 fine sand with some clay; diffuse 7.5 YR 5/6 coarse mottles & fine accumulations
		32.00	9.75	4C	10YR 5/6 wet silt/fine sand; massive; base of core at 32 feet
3	456	1.42	0.43	U	10YR 3/2 mixed silt Loam fill; brick concrete, limestone present
		2.67	0.81		10YR 5/6 clay Loam
		4.00	1.22		10YR 6/3 medium to coarse sand
		4.67	1.42		Mixed sandy fill, 10YR 5/8 at base due to perched water table; abrupt
		12.92	3.94	2C1	10 YR 6/2 silt loam, common fine 7.5YR 5/8 (Fe) and 7.5 YR 2.5/3 2 (Mn) accumulations and coarse mottles; massive; clear
		18.00	5.49	2C2	10 YR 6/2 silt loam, lower frequency of accumulations and coarse mottles; massive; clear
		20.00	6.10	3C	10YR 6/2 sand, coarse 10YR 5/6 mottles; clear
		24.00	7.32	4C	10YR 6/1 silt ; 10YR 5/6 coarse mottles ; possibly bedded (lacustrine?)
4	457	1.17	0.36	U	10YR 3/2 mixed silt loam fill; plastic present (topsoil)

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
		7.58	2.31		Mixed fills; brick fragments, coal, concrete present; generally brown to yellowish brown in color
		10.00	3.05	2C1	10 YR 6/2 silt loam, occasional fine 7.5YR 5/6 (Fe) accumulations ; massive; gradual
		13.33	4.06	2C2	10YR 5/4 silt loam; massive
		16.92	5.16	3C	10YR 5/4 to 5/6 medium sand
		26.25	8.00	4C	5YR 5/4 silt loam, sand lens at 19 to 19.25 feet
		28.00	8.53	5C	10YR 6/4 wet compact silt/silty clay loam
5	460	0.75	0.23	U	10YR 3/2 mixed silt loam fill; brick present (topsoil)
		2.83	0.86	Bt	10YR 5/4 silt loam, medium subangular blocky structure , common small roots, very fine 10YR 5/6 accumulations; clear
		4.67	1.42	BC	10YR 5/4 silt loam; massive, fine 10YR 6/1 depletions
		20.83	6.35	2C	10YR 5/4 medium sand; massive/single grain; mineral staining in lower 2 feet indicates bedding
		32.00	9.75	3C	7.5YR 5/4 to 10YR 5/4 silt or silt loam; massive
6A	462	1.58	0.48	U	10YR 3/2 and 10YR 5/4 mixed silt loam fill
		4.00	1.22		Coal/ash/cinder fill (poor recovery)
		8.00	2.44		10YR 2/1 coal/cinder ash; concrete at top (poor recovery)
		10.00	3.05		2.5Y 4/1 and 10YR 2/1 coal, cinder and ash; refusal at 10 feet
6B	462	4.00	1.22	U	Mixed fill, 10YR 3/3 clay, concrete and brick rubble (poor recovery)
		8.00	2.44		Lenses of coal cinder and concrete fragments (poor recovery)
		10.00	3.05		Concrete fragments and sand; refusal at 11.5 feet; no recovery below 10.0 feet
7		0.67	0.20	U	10YR 4/4 silt loam
		1.67	0.51		2.5Y 5/1 gray silt loam, coal brick present
		2.67	0.81		10YR 4/1 silt loam, charcoal present
		4.00	1.22		Concrete and mixed silt loam fill
		6.25	1.91		10YR 4/1 clay loam
		8.00	2.44		10YR 5/4 silt loam, brick present
		10.00	3.05		10YR 5/4 silt loam clean fill
		10.67	3.25		10YR 4/2 silt loam and cinder fill
		15.00	4.57		Mixed fill; sand and silt ; Refusal at 15 ft, concrete fragments in shoe

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
8A	452	4.00	1.22	U	1.67 ft of 10YR 4/4 silt loam fill and 0.3 ft of concrete. Refusal at 4 feet
8B	452	1.83	0.56	U	10YR 4/4 silt loam with brick fragments and coal
		2.00	0.61		Concrete
		8.33	2.54		10YR 4/1 silt loam fill, common brick fragments, coal, concrete fragments and concrete dust
		9.00	2.74		Concrete
		12.00	3.66		10Y 4/1 compact silt loam/silty clay loam, common brick fragments and coal
		14.00	4.27		No recovery, refusal on concrete at 14 feet
9	444	11.67	3.56	U	Mixed fills, silty to clayey, gravels, brick fragments, concrete present
		13.33	4.06		Concrete overlying sandy fill
		15.17	4.62		Mixed silt loam fill, 10YR 4/4 to 10YR 5/6
		16.67	5.08	2C1	10YR 6/2 silt loam; massive; gradual
		20.83	6.35	2C2	10YR 5/4 10YR 5/4 silt to fine sand, very fine 10YR 5/6 accumulations, limestone gravel at 17.5 ft; possibly finely bedded
		25.33	7.72	3C	Finely bedded medium to coarse sand
		32.00	9.75	4C	10YR 5/2 fine sandy loam; massive; wet, very sticky; no recovery below 30.0 ft; refusal on rock at 32 ft
10	444	12.00	3.66	U	Mixed fills, generally 10YR 4/4 compact silt with concrete fragments, large brick fragments
		16.00	4.88		Sand and brick fragments
		18.33	5.59		Concrete, coal cinder and brick
		21.67	6.60	2C	10YR 5/4 silt loam; finely bedded
		25.33	7.72	3C	Finely bedded sand, 10YR 5/4 and lenses of 10YR 4/1
		28.67	8.74	4Cg	10YR 4/1 very fine sand
		32.00	9.75	5Cg	10YR 4/1 clay, massive, sticky, very plastic; sand lens at 30.4 to 30.6 feet
11	458	10.00	3.05	U	Mixed fills, varying from 10YR 5/4 to 10YR 4/1, brick and concrete fragments in layers throughout; brick and concrete from 8-10 ft
		20.00	6.10		10YR 4/1 silt loam to silty clay loam, small brick fragments, concrete and coal
		20.67	6.30	2C1	2.5Y 5/3 firm silty clay loam above finely lensed 10YR 5/4 silt loam, limestone at base; clear
		24.00	7.32	2C2	2.5Y 5/2 firm, finely bedded massive silt, common fine to coarse 7.5YR 4/6 mottles and very fine accumulations; clear

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
		25.75	7.85	2C3	2.5Y 5/1 firm finely bedded silt with coarse 7.5YR 5/6 accumulations; sand lenses at 24.1 to 24.6 feet and 25.7 feet; clear
		38.58	11.76	2C4	2.5Y 6/2 firm massive silt, common fine 7.5YR 4/2 accumulations, occasional coarse 7.5YR 5/6 mottles; clear/abrupt
		44.00	13.41	3C	10YR 5/1 interbedded very fine sand to silt
		47.67	14.53	4C	2.5Y 5/2 silty clay, massive, very plastic, firm, non-sticky
		49.33	15.04	5C	10YR 5/6 silt to very fine sand , massive, wet; coarse diffuse 10YR 5/8 mottles; abrupt
		55.00	16.76	6C	2.5Y 6/2 compact clay, finely laminated, occasional stringers/lenses of sand; limestone fragments below 52.0 feet
12	456	0.58	0.18	U	10YR 3/2 sod and 10YR 4/4 clean silt loam fill
		1.00	0.30		Concrete fragments
		8.75	2.67		10YR 4/1 compact silt; brick, coal, concrete present
		13.33	4.06		10Y4/1 compact silt to silty clay loam; common gravels, brick; bottle glass at 11.7 ft
		15.42	4.70		10YR 4/4 silt, clean fill
		26.00	7.92		Brick fragments and concrete; refusal at 26.0 ft
13	453	0.67	0.20	U	10YR 4/4 silt loam clean fill/sod
		4.67	1.42		10YR 4/1 compact silt loam to silty clay loam fill; brick concrete and brick dust present
		8.50	2.59		10Y 4/1 silt loam to silty clay loam fill; brick concrete and brick dust present
		10.00	3.05		10YR 2/1 gravels and sand
		11.67	3.56		10YR 4/4 clean silt loam fill
		16.00	4.88		Brick and concrete
		16.42	5.00		10YR 2/1 cinders and silt; possible former road?
		16.83	5.13		10YR 5/6 silt, wet, soft, no structure (disturbed?)
		29.17	8.89	2C	2.5Y 6/2 silt loam, common fine 7.5YR 4/6 accumulations and coarse mottles, beds of fine sand 23.7 to 24.1 feet and 26.7 to 27.1 feet, compact at base; gradual
		33.50	10.21	3C1	10YR 5/3 silt with lenses/stringers of medium sand
		37.67	11.48	3C2	10YR 5/6 sand, silt lens at 34.8, sand becomes progressively coarser with depth; abrupt
		43.50	13.26	4C	2.5Y 6/2 compact, massive silt to silty clay, clear fine 7.5YR 5/6 accumulations and mottles
14	454	0.92	0.28	U	10YR 4/4 silt loam, clean fill/sod

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
		7.00	2.13		10YR 4/1 to 10Y 4/1 silt loam to silty clay loam; bricks and concrete throughout
		9.58	2.92		10YR 4/4 silt loam, clean fill
		10.17	3.10		cinders/clinkers and crushed limestone
		12.00	3.66		10YR 4/4 silt loam, clean fill
		17.33	5.28		Crushed brick and concrete
		18.08	5.51		10YR 4/4 silt loam, soft, structureless
		26.67	8.13	2C	2.5Y 6/2 silt loam, common fine 7.5YR 4/6 accumulations and coarse mottles, clear
		29.33	8.94	3C	Interbedded 10YR 5/4 sands and 2.5Y 6/2 silts
		34.67	10.57	4C	10YR 5/4 to 5/6 compact massive silt, few fine 2.5Y 2/1 accumulations; gradual
		36.00	10.97	5C	10YR 5/4 to 5/6 medium sand
15	454	0.42	0.13	U	10YR 4/4 silt loam clean fill
		10.08	3.07		Mixed fills, 10YR 4/1 to 4/2 silt loam to silty clay loam, brick gravel, concrete throughout
		10.33	3.15		7.5YR 5/6 clean fill; abrupt
		10.58	3.23		10YR 5/1 silt, wet, soft, structureless
		23.75	7.24	2C	2.5Y 6/2 silt loam, common fine 7.5YR 4/6 accumulations and coarse mottles increasing with depth; massive to weak subangular blocky structure at top , becomes finely bedded with depth; clear
		30.83	9.40	3C	2.5Y5/3 Interbedded sands and silts, sand beds become coarser, thicker with depth with depth
		32.00	9.75	4C	Compact 7.5YR 5/4 silt
16	454	0.83	0.25	U	10YR 4/4 silt loam fill, limestone fragments present
		5.00	1.52		10YR 4/1 silt loam, abundant brick and concrete
		5.50	1.68		10YR 7/1 coarse sand
		9.50	2.90		Mixed silty fills, generally 10YR 5/4 to 7.5YR 6/6, clean but cloddy
		16.00	4.88		Cinders, brick rubble, concrete at base (foundation/basement?); refusal at 16.0 feet
17	455	2.00	0.61	U	10YR 4/4 silt loam, brick and concrete present
		18.67	5.69		10YR 4/1 to 10YR 5/4 silts with abundant, brick concrete, cinders, and gravel
		26.50	8.08	2C	2.5Y 6/2 silt loam, common distinct linear mottles in upper 0.5 feet; very fine sandy lenses at 22.9-23.2 feet, 24.2-24.3 feet; abrupt
		27.33	8.33	3C	10YR 7/1 coarse sand
		30.42	9.27	4C	Finely interbedded sands and silts, 80-90% sands grading to 7.5YR 7/6 bedded sands below 29.2 ft

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
		33.00	10.06	5C	7.5YR 5/4 massive silt; refusal at 33 ft on bedrock
18	455	1.00	0.30	U	10YR 4/4 silt loam clean fill
		8.00	2.44		Mixed silty to silty clay loam fills, 10YR 4/1, 10Y4/1, 10YR 5/4, brick rubble and concrete concentrated in upper half
		8.33	2.54		10YR 2/1 cinder/clinker layer
		12.00	3.66		10YR 5/4 silt loam clean fill, cinders at base; refusal at 12.0 feet
19	455	1.50	0.46	U	10YR 4/4 silt loam, brick and concrete present
		4.67	1.42		10YR 4/1 compact silty clay loam ; brick and concrete throughout
		9.58	2.92		10Y 6/1 compact silty clay loam, minor amount of concrete and brick present
		16.42	5.00		10YR 5/4 silt loam clean fill
		19.42	5.92		Mostly brick fragments and dust, sand, mortar and concrete in lower half
		32.50	9.91		Clean silt loam fill, varies from 10YR 5/6 to 10YR 4/1, well-mixed, no discrete layers or lifts, soft; refusal on concrete at 32.5 feet
20	459	1.33	0.41	U	10YR 5/4 gravelly silt loam
		1.67	0.51		10YR 4/1 silt loam, coal and bricks present
		4.83	1.47		Concrete and brick rubble
		15.50	4.72		10YR 4/1 to 10Y 6/1 compact silt loam to silty clay loam
		16.00	4.88		Compacted clinkers/cinders
		16.50	5.03		Concrete
		18.17	5.54		10YR 5/4 silt loam clean fill
		22.50	6.86		Brick dust and fragments (poor recovery)
		28.00	8.53		2.5y 6/2 silt, 10YR 4/1 laminae in upper half, concrete fragment at 22.9 feet; refusal on concrete at 29 ft
21	460	1.00	0.30	U	10YR 4/4 silt loam, few small brick fragments
		8.00	2.44		2.5Y 5/1 silt loam to silty clay loam, compact, abundant brick fragments, some wood, clear glass and limestone gravels present
		8.33	2.54		Concrete
		17.50	5.33		10YR 4/1 compact silt loam, abundant small brick fragments, concrete
		23.33	7.11		Mixed fill; primarily 10Y 6/1 silt loam to silty clay loam, lens of brick fragments at 19.5 to 20 ft
		23.50	7.16		Cinders/clinkers
		24.00	7.32		10YR 5/4 silt loam clean fill

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
		33.25	10.13		Lenses of sand, clinkers, brick and concrete
		37.67	11.48	2C	10YR 5/4 silt loam, common fine 7.5YR 4/6 accumulations below 34.2 ft, common distinct 10YR 6/1 depletions between 34.2 and 35.8
		38.00	11.58	3C	Bedded medium sands, 10YR 6/2 and 7.5YR 5/8, single grain; refusal (rock) at 38 feet
22	461	1.00	0.30	U	10YR 4/4 silt loam clean fill
		15.50	4.72		Mixed fill, 10YR 4/1 silt loam to silty clay loam with abundant brick, concrete and gravel
		17.75	5.41		10Y 5/1 silty clay loam clean fill
		18.25	5.56		2.5Y 2/1 cinders, sand and gravel
		20.00	6.10		10YR 5/4 silt loam clean fill
		21.42	6.53		Cinders/clinkers, sand brick and concrete
		24.58	7.49	2BC	7.5YR 4/6 silt loam, weak subangular blocky structure, common fine distinct 2.5Y3/2 accumulations; clear
		35.33	10.77	2C	2.5Y 6/2 silt loam, clear very coarse 7.5YR 5/8 and 7.5YR 3/2 mottles
		36.17	11.02	3C	10YR 4/4 fine sand, massive
		36.75	11.20	4C	7.5YR 5/4 silt, massive, few fine clear 7.5YR 5/8 mottles
		37.50	11.43	R	Limestone bedrock; refusal at 37.5 ft
23	458	1.00	0.30	U	10YR 4/4 to 5/4 silt loam mixed fill (sod and topsoil)
		22.00	6.71		Mixed fill, variably thick lenses of 10YR 5/6, 10YR 4/1 and 10Y 6/1 silt loam to silty clay loam; abundant brick, gravel, concrete and clinkers; refusal on concrete at 22 ft
24	459	1.67	0.51	U	10YR 4/4 to 5/4 silt loam, few gravels, clean fill
		22.58	6.88		Mixed fills, 10YR 4/1 to 2.5Y 5/1 silt loam to silty clay loam; brick, concrete and minor amounts of gravel throughout
		23.67	7.21		10YR 5/4 silt loam clean fill
		31.33	9.55		Bricks and brick fragments, clinkers and brick dust at base (poor recovery)
		32.83	10.01	2C1	2.5Y 6/2 silt loam, very finely bedded, very few fine 2.5Y 2/1 accumulations
		35.00	10.67	2C2	2.5Y 6/2 silt loam to silty clay loam, common fine to coarse 7.5YR 5/6 mottles; very finely bedded, soft, sticky, plastic; refusal on rock at 35 ft
25	456	1.42	0.43	U	10YR 4/4 to 5/4 silt loam fill, gravels in lower half
		8.00	2.44		10YR 4/1 silt loam mixed with 10Y 6/1 silty clay loam, brick and rock present
		12.00	3.66		Rock, white to gray hard microcrystalline limestone

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
		19.00	5.79		10Y 6/1 silt loam to silty clay loam, many small brick fragments, abundant small to large angular unweathered limestone fragments, cinders and small gravels at base; refusal on rock (?) at 19 ft
26	459	1.17	0.36	U	10YR 5/4 to 5/6 silt loam, angular gravels in lower half
		15.50	4.72		10YR 4/1 silt loam and 10Y 6/1 silty clay loam fill deposits with abundant brick and concrete, many large fragments of angular limestone
		23.00	7.01		Large angular limestone and small brick fragments in a 7.5YR 4/4 silty matrix; pulverized concrete at base; refusal on concrete at 23 ft
27	458	0.50	0.15	U	10YR 4/4 silt loam, clean fill and sod
		4.00	1.22		10YR 5/3 dry compact silt loam fill, weak platy structure, many brick and angular rock fragments
		12.00	3.66		Mixed fill, generally 2.5Y 5/4, possible stratification at breaks in the sequence on rocks, cinders and/or bricks; crushed rock 10.5 feet to base; refusal on rock at 12 ft
28	460	0.83	0.25	U	10YR 4/4 silt loam, clean fill and sod
		13.50	4.11		10YR 4/4 dry compact silt loam, weak platy structure to 10ft, generally consistent throughout, but interrupted by lenses or inclusions of rock, brick or cinder at approximately 1 ft, 4.5 ft, 6 ft, 7.5 ft, 8.5 ft, 13.2 ft. Possibly stratified fill.
		14.00	4.27		2.5Y 4/1 compact silt loam, abundant small brick fragments; refusal at 14 feet (rock?)
29	442	1.00	0.30	U	10YR 4/4 silt loam, clean fill and sod
		14.00	4.27		Mixed silt loam to silty clay loam fill ranging from 7.5YR 5/6 to 10YR 4/1
		15.67	4.78	2C	10YR 5/4 interbedded sands and silts, beds averaging approximately 0.25 to 0.3 ft in thickness
		17.67	5.38	3C	10YR 5/2 bedded medium to fine sands; clay gall at 16.8 ft
		22.50	6.86	4C1	7.5YR 6/2 silt loam, few fine distinct 7.5YR 5/6 accumulations, massive to very finely bedded; gradual
		27.17	8.28	4C2	2.5Y 6/2 silty clay loam, common very coarse 7.5YR 6/6 mottles, few fine 7.5YR 4/6 accumulations, accumulations increasing with depth
		27.50	8.38	4C3	2.5Y 5/3 fine to medium sand; refusal on rock at 27.5 ft
30	447	0.67	0.20	U	10 YR 4/4 silt loam clean fill/sod

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
		7.42	2.26		10YR 4/3 to 4/4 silt loam to silty clay loam fill, abundant small to large brick fragments, concrete, brick fragments at base
		9.50	2.90		10YR 5/4 silt loam, coal and brick fragments present, cinders at base
		18.00	5.49		Bricks, Brick fragments, brick dust
		18.17	5.54		Concrete, brick fragments and 10YR 3/2 sand
		22.50	6.86	?	10Y 6/1 to 10Y 4/1 interbedded sands and silts, strong organic odor; unclear if intact sediments or fill, possibly contaminated
		23.42	7.14	2C1	7.5YR 6/2 compact silt loam, massive to finely bedded, mottled with 10B 5/1 ; clear
		24.00	7.32	2C2	7.5YR 5/6 finely bedded medium sands; clear
		27.50	8.38	3C1	7.5YR 6/2 silt loam, firm, massive to finely bedded, common clear 7.5YR 4/6 accumulations; gradual
		29.50	8.99	3C2	7.5YR 6/2 silt loam, to silty clay loam, common coarse 2.5Y 6/1 mottles; abrupt
		35.33	10.77	4C	Interbedded medium to fine sands and silts, generally 2.5Y 4/4; abrupt
		39.00	11.89	R	Rock and very coarse sand/small gravels; refusal on rock at 39 ft
31	460	0.67	0.20	U	10YR 4/4 silt loam, clean fill and sod
		8.00	2.44		10YR 5/6 dry compact silt loam, abundant brick, rock fragments and coal
		11.08	3.38		Concrete, rock and cinders (poor recovery)
		13.75	4.19		10YR 5/6 silt loam clean fill, lens of cinders and brick 12.5 to 12.7 feet
		18.00	5.49		Mix of cinders, brick, concrete, sand and rock; refusal on concrete at 18 ft
32	442	0.75	0.23	U	10YR 4/4 silt loam clean fill and sod
		10.42	3.18		Mixed fill, primarily brick, concrete and rock fragments, lenses of 10YR 4/4 to 5/4 compact silt loam, clinker lens at base
		12.00	3.66	2C1	2.5Y 6/1 silt loam, irregular mottles/bands of 5YR 4/4; gradual
		14.25	4.34	2C2	2.5Y 6/1 silt loam, irregular mottles/bands of 5YR 4/4
		19.33	5.89	3C	Interbedded sand and silt beds 0.25 to 1 ft in thickness, irregular mottles and accumulations throughout; abrupt
		21.00	6.40	4C1	7.5YR 6/2 compact silt loam to very fine sand; clear
		22.33	6.81	4C2	7.5YR 5/6 compact fine sand, massive/single grain; clear

Core #	Surface (ft amsl)	(Feet)	(Meters)	Horizon	Description
		27.08	8.26	4C3	2.5Y 6/3 compact massive silt, few clear 7.5YR 5/6 mottles; clear to abrupt
		28.33	8.64	5C	Thin beds of 10YR 4/4 sand and 2.5Y 6/3 silt; abrupt
		28.50	8.69	R	Limestone; refusal at 28.5 ft
33	445	0.50	0.15	U	10YR 4/2 silt loam, clean fill and sod
		1.50	0.46		Brick fragments, rock and sand
		5.67	1.73		10YR 4/4 to 6/1 stratified clean silty fill
		7.00	2.13		Brick and concrete rubble
		8.00	2.44		10YR 3/3 and 10YR 5/6 clean silty fill
		18.33	5.59		Rock, sand and brick rubble, tin fragments at base
		19.75	6.02	2C	2.5Y 6/2 silt, few fine 7.5YR 5/6 mottles; clear to gradual
		22.33	6.81	3C	2.5Y 5/2 interbedded sands and silts; clear
		28.33	8.64	4C	Bedded fine to medium sands, 2.5Y 4/4 at top, grades to 10YR 6/8 at base, grain size and bed thickness increasing with depth; abrupt
		32.25	9.83	5Cg	N4/0 Silty clay, compact at top and base, sticky, plastic soft
		33.25	10.13	R	Limestone, 2.5Y 4/4 clay as infill in crevice/void
34	446	0.92	0.28	U	10YR 4/4 silt loam, clean fill and sod
		9.17	2.79		Mixed silt loam, clean fill, generally 2.5Y 5/2 with relict mottling and accumulations
		9.92	3.02		10YR 5/6 clean silt loam fill
		18.33	5.59		Brick, rock and concrete rubble fill
		25.67	7.82	2Cg1	Bedded fine sands N 2.5/0 to N 5/0, bedding poorly defined in saturated lower portion; clear
		29.08	8.86	2Cg2	Medium sands, generally 2.5Y 4/4, indistinct bedding in middle portion; clear
		31.33	9.55	2Cg3	Interbedded N 4/0 sands and silts; abrupt
		41.17	12.55	3C	7.5YR 6/2 silt and very fine sand, few diffuse 7.5YR 5/6 and 10YR 6/1 mottles , massive to very finely bedded; abrupt
		42.00	12.80	4C	7.5YR 5/8 clay, compact, plastic, non-sticky; refusal (rock?) at 42 ft

Appendix B

Qualifications of Investigators

QUALIFICATIONS OF THE INVESTIGATORS

The qualifications of the supervisory staff for this study meet the Secretary of the Interior's Professional Qualification Standards (48 *Federal Register* 44738–44739; 36 CFR Part 61, Appendix A).

CHARLES LEEDECKER, PROJECT MANAGER, RPA
MA, Anthropology, The George Washington University, 1978
BA, Anthropology, Cornell University, 1970

Mr. LeeDecker is responsible for the general management of The Louis Berger Group's cultural resource operations from the Washington, D.C., office, including archaeological research projects and historic preservation planning studies involving historic, prehistoric, and urban resources throughout the Middle Atlantic, Southeast, and Midwest regions of the United States. He has more than 35 years of professional experience as a consulting archeologist and an extensive background in urban archeology, including work on industrial and domestic sites. His urban archeological experience includes work in many cities, including Washington, D.C.; New York City; Philadelphia; Albany; Wilmington, Delaware; Raleigh, North Carolina; Scranton, Pennsylvania; Alexandria, Virginia; Des Moines, Iowa; Detroit, Michigan; and North Las Vegas, Nevada.

CHRISTOPHER SCHOEN, PRINCIPAL INVESTIGATOR, RPA
MA, Anthropology, University of Nebraska-Lincoln, 1985
BA, Sociology, University of Wisconsin-LaCrosse, 1976

Mr. Christopher Schoen has 33 years of professional experience in archeology. Based in LBG's Marion, Iowa, office, he serves as a principal investigator, conducting cultural resource investigations in accordance with the Section 106 process and the National Environmental Policy Act (NEPA). He is responsible for preparing cultural resource assessments for Environmental Assessments (EAs) and Environmental Impact Statements (EISs) as well as designing and implementing research proposals for all phases of cultural resource investigations, including analysis of collected materials and completion of associated technical reports, professional papers, articles, and presentations. Mr. Schoen has extensive experience in historical research, historic context studies, and archeological site inventory, eligibility assessment, and data recovery. He has investigated a variety of historic sites, including military forts, farmsteads, urban residences, railroad depots, schools, CCC camps, logging camps, mills, and light industry, as well as prehistoric sites from the Early Archaic through Late Woodland periods. He has completed long corridor studies for departments of transportation, pipeline companies, and transmission companies. Since joining LBG, Mr. Schoen has directed projects in Minnesota, Iowa, Indiana, Illinois, Kansas, Nebraska, South Dakota, and Wisconsin. Between 1985 and 1998, Mr. Schoen was responsible for projects in Kansas, Nebraska, and Wyoming. He has also participated in National Park Service (NPS) projects in Iowa, Michigan, Minnesota, Missouri, and Wisconsin.

DELLAND GOULD, FIELD SUPERVISOR
MS, Candidate, Geoscience, University of Iowa (in progress). Thesis subject: Holocene Alluvial Stratigraphy and Geoarchaeology of the Esopus Creek Valley, Ulster County, New York
BA, Sociology and Anthropology, West Virginia University, 1994

Mr. Gould has a total of 20 years of experience as an archeologist, including 15 years with LBG. As a senior field supervisor with LB, Mr. Gould is responsible for project planning, archeological survey, testing, and data recovery efforts involving historic, prehistoric, and urban resources, and the preparation of technical reports. He has contributed to projects in more than 20 states, including the Northeast, Middle Atlantic, Southeast, Midwest, Southwest, Great Plains, and Great Basin regions, with specific interests in artifact analysis, site formation processes, and geomorphology.