Final/Accepted
Fee Proposal

PROFESSIONAL SERVICES FEE PROPOSAL
DIVISION OF PROPERTY MANAGEMENT & CONSTRUCTION

THIS FEE PROPOSAL TO BE RETURNED
IN A SEPARATELY SEALED ENVELOPE TO
Division of Property Management & Construction
33 WEST STATE ST 9TH FLOOR, PLAN ROOM
P.O. Box 034
Trenton, NJ 08625-0034
Attention: SHAWN TAYLOR

DATE: August 28, 2018
PROJECT NO. P1176-00

RECEIVED
2018 SEP 11 A 7:4
TREASURY DEPT
PROCUREMENT

THIS PROPOSAL DUE DATE, NO LATER THAN 2:00 PM, TUESDAY AUGUST 28, 2018

FIRM NAME Louis Berger

THE UNDERSIGNED PROPOSES TO PROVIDE ALL PROFESSIONAL SERVICES AS STATED IN THE REQUEST FOR PROPOSAL AND SCOPE OF WORK

	CONSULTANT FEES	SUB-CONSULTANT FEES
PHASE I - ARCHAEOLOGICAL CONTEXT BACKGROUND RESEARCH AND RESEARCH DESIGN	$ 35,481.16	$ 7,200.00
PHASE II - FIELD INVESTIGATION AND SURVEY PHASE	$ 179,511.96	$ 22,900.00
PHASE III - ANALYSIS & REPORTING PHASE	$ 58,622.88	$ 36,785.00
PHASE IV - PROJECT CLOSE-OUT PHASE	$ 764.96	$ 0.00
ALLOWANCE FOR WORK SPECIFIED BY THE CONSULTANT	$ 70.00*	$ 0.00
TOTALS	$ 274,450.96	$ 66,885.00
TOTAL CONTRACT AMOUNT	$ 341,335.96	

PROPOSAL TO HOLD GOOD FOR 60 DAYS AFTER THE DUE DATE.

Signature and Title of Principle or Individual of the firm authorized to sign contractual documents:
Signature of the consultant below attests that the Consultant has read, understands and agrees to all terms, conditions and specifications set forth in the Request for Proposal (RFP) and Consultant Proposal Package

Signature: S.T. McGonigal Print Name: Sean T. McGonigal
Title: Vice President Date: 9/5/2018 Revised 9/6/2018
Witness Signature: Lauren Hayden Print Name: Lauren Hayden

ATTACH PROOF OF REQUIRED INSURANCE COVERAGE
See attached requirements per "General Conditions to Consultant Agreement" Section 27, pp. 18-19
PROFESSIONAL LIABILITY INSURANCE
($100,000 MIN LIMIT/$25,000 MAX DEDUCTIBLE)

* Natural Heritage Data Request Fee to obtain known locations of rare plant species. Per Addendum D "A fee of $70 is required for this information. Consultants are instructed to include this fee within their fee proposal in the line item titled "Allowance for Work Specified by the Consultant".

SUB-CONSULTANT TASK/LABOR/FEE SHEET
A/E:

Final/Accepted Fee Proposal

Project # P1176-00
Project Name: Archaeological and Geomorphological Investigation
Project Location: Higbee Beach Wildlife Management Area
Lower Township, Cape May County, NJ

PROJECT PHASE OR TASK	SUB CONSULTANTS LEVEL OF EFFORT IN HOURS/FEE					TOTALS PER TASK
	FIRM NAME	Geo-Sci Consultants	Direct AME	Justine McKnight		
PHASE I - ARCHAEOLOGICAL CONTEXT BACKGROUND	HOURS	48				48
RESEARCH AND RESEARCH DESIGN PHASE	AMOUNT	$7,200.00	$	$	$	$7,200.00
PHASE II - FIELD INVESTIGATION	HOURS	216				216
AND SURVEY PHASE	AMOUNT	$22,900	$	$	$	$22,900
PHASE III - ANALYSIS &	HOURS	160	30	20		210
REPORTING PHASE	AMOUNT	$29,400.00	$4,485.00	$2,900.00	$	$36,785.00
PHASE IV - PROJECT	HOURS					
CLOSE-OUT PHASE	AMOUNT	$	$	$	$	$
TOTALS	HOURS	424	30	20		474
	AMOUNT	$59,500.00	4,485.00	$2,900.00	$	$66,885.00
					TOTAL	

* PROVIDE FIRM NAME(S) AT TOP OF COLUMN(S). MAKE COPY OF THIS SHEET IF MORE SPACE IS NEEDED.

PLEASE ATTACH PROOF OF SUBCONSULTANT PREQUALIFICATION (48A) WITH DPMC

August 28, 2018
Department of Treasury
Division of Property Management and Construction
Contracts & Procurement Unit
33 West State Street, 9th Floor, Plan Room
Attention: Shawn Taylor
PO Box 034
Trenton, NJ 08625-0034

Louis Berger

RE: Proposal for Archaeological and Geomorphological Investigation – Higbee Beach Wildlife Management Area, Lower Township, Cape May County, New Jersey

Dear Mr. Taylor:

Louis Berger U.S., Inc. (Louis Berger), is pleased to submit its proposal to conduct an archaeological and geomorphological investigation in the Higbee Beach Wildlife Management Area (WMA), Lower Township, Cape May County, New Jersey. Since the development of its specialized heritage resource management practice in 1981, Louis Berger has completed thousands of heritage resource projects for a variety of federal, state, and private clients in all 50 states, Washington, DC, and internationally. Based in Morristown, New Jersey, the Louis Berger team stands ready to meet the Division of Property Management's (DPMC's) and New Jersey Department of Environmental Protection's (NJDEP's) needs by offering the following:

- **A Highly Experienced Team with a Successful History of Collaboration.** Proposed project manager Lauren Hayden, RPA, ENV SP, has managed and/or supervised archaeological surveys for more than 20 projects in the Northeast, including a Phase I study at Higbee Beach. Dr. Stuart Fiedel will serve as archaeologist/principal investigator and brings 40 years of experience supervising archaeological research projects involving prehistoric and historic resources. The geomorphological investigation will be led by key subconsultant Geo-Sci Consultants, LLC's Dr. Dan Wagner, who, during his 42 years of experience, has has either directed or contributed to some 1,700 projects, including nearly 810 geoarchaeological studies. Also serving as key personnel on this project will be Justin Baker, a certified Professional Wetland Scientist with 18 years of experience, which includes restoration design at Higbee Beach and Mad Horse Creek WMAs. When needed, additional equipment, staff, and specialized expertise will be drawn from other Louis Berger offices across the nation. Louis Berger also prepares hundreds of full-length technical cultural resource reports per year and maintains a full-service in-house production department.

- **Relevant Experience with Archaeological and Geomorphological Investigations.** The Louis Berger team brings a depth of knowledge and experience working with the NJDEP and in coastal settings, including recent archaeological investigation and wetland restoration work in the Higbee Beach WMA and the Mad Horse Creek WMA. These and other projects, such as the Garden State Parkway Interchange 10 Improvements Project, the Chesapeake & Ohio (C&O) Canal National Historical Park Archeological Identification and Evaluation Study, and Phase I archaeological investigations of Stones Creek and Bear Garden Game land tracts are detailed in **Section A.**

- **Commitment to Meeting an Agressive Schedule.** Louis Berger understands the time constraints of the project and the need for an expedited schedule. In order to complete all phases of the project within 246 calendar days, the field team will send results and artifacts to be processed and analyzed to office staff on a weekly basis. The Louis Berger team will be dedicated to completing the deliverables according to the schedule set out in **Section G.**

- **A Reputation for Quality.** Louis Berger has developed an outstanding reputation specifically for its heritage resource management work and has received numerous awards and commendations. The firm's highly skilled professionals have decades of experience in creating, managing, executing, and publishing the results of cultural resource studies. To ensure the submission of high-quality products and services for projects, Louis Berger subjects every aspect of each deliverable to strict Quality Assurance/Quality Control (QA/QC) requirements under a formal, corporate QA/QC program. This attention to quality provides the highest value of service, minimizes overall project costs, and ensures that data and documentation are scientifically defensible and meet regulatory requirements.

Please feel free to contact me with any questions regarding our proposal at 518.514.9303 / hluhman@louisberger.com or our Project Manager, Lauren Hayden, at 973.407.1275 / lhayden@louisberger.com. Thank you for considering Louis Berger for this important assignment.

Sincerely,

Hope Luhman, PhD, RPA
Senior Vice President

412 Mount Kemble Avenue / Morristown / New Jersey / 07962-1946 / USA / Tel +1.973.407.1000
louisberger.com

A Firm / Project Team Experience

Louis Berger U.S., Inc. (Louis Berger) is pleased to present its proposal to conduct an archaeological and geomorphological investigation in the Higbee Beach Wildlife Management Area (WMA), Lower Township, Cape May County, New Jersey. Louis Berger brings a depth of knowledge and experience working with the New Jersey Department of Environmental Protection (NJDEP) and in Higbee Beach WMA, having led an ongoing multi-phased tidal marsh restoration and redevelopment project at the site. The team's proposed project manager Lauren Hayden, RPA, ENV SP, recently supervised a Phase I archaeological survey in association with the restoration of the salt marshes within the Higbee Beach WMA. Key personnel, including Ms. Hayden, proposed wetland scientist Justin Baker, PWS, CE, CERP, and proposed principal investigator Dr. Stuart Fiedel have extensive experience working in coastal settings and have collaborated on projects throughout New Jersey and the Northeast. Additionally, Louis Berger has teamed with **Geo-Sci Consultants, LLC's (Geo-Sci's)** Dr. Dan Wagner and Dr. Darrin Lowery, to provide geomorphology and coastal geoarchaeological services. Justine McKnight and DirectAMS will provide archeobotanical analysis and carbon dating services, respectively. The Louis Berger key team members are introduced **below,** and team project experience begins on the **following page.**

Louis Berger

Louis Berger, an award-winning environmental planning and engineering firm founded in 1953, is one of the largest providers of heritage resource management services in the United States. The firm employs nearly 6,000 professionals and maintains 117 offices worldwide with 51 offices in the United States, including five nationwide centers of expertise for heritage resource services. Since the development of its specialized Heritage Resource Management practice in 1981, when Louis Berger experts assisted the New Jersey Department of Transportation (NJDOT) with heritage resource services for the impact of several highways known as the Trenton Complex, Louis Berger has completed thousands of heritage projects for a variety of federal, state, and private clients in all 50 states and internationally.

The firm has developed an outstanding reputation for its heritage resource management work and has received numerous commendations and awards from groups such as the American Cultural Resources Association (ACRA) and the Consulting Engineers Council. Louis Berger's business philosophy is to provide clients and the public with the best possible value. As part of this approach, Louis Berger emphasizes best value principles throughout its operations, giving highly qualified people the tools and the initiative to complete their projects in the most effective and efficient way. Louis Berger has demonstrated the capacity to bring creative, cost-effective solutions to all types of heritage studies in its collaborative, team approach with clients and review agencies, working closely with the client throughout all stages in the process of resource identification, evaluation, and treatment, beginning with preliminary project planning. The firm's highly skilled professionals have decades of experience in conceiving, managing, carrying out, and publishing the results of heritage resource studies. The technical expertise of the key staff has resulted in the publication of many articles in peer-reviewed publications and augments the team's experience and capabilities, including the ability to take part in public meetings and develop public outreach activities as needed.

The firm prides itself not only on the quality of its work but on the timeliness of field investigations and report completion. Louis Berger's heritage resource professionals have a proven record of accomplishment for mobilizing large archaeological teams and managing simultaneous projects and phases of investigation. Because of its large size and the diversity of skills developed by its staff, Louis Berger can respond quickly and effectively to all types of project situations. Louis Berger maintains a well-trained, full-time, permanent field team that can be quickly mobilized for long-term projects as well as for emergency work or short-term projects. Heritage resource staff also include a full-time crew coordinator team responsible for recruiting, hiring, and assigning field technicians.

Louis Berger has provided services on more than 120 projects across more than 150 environmental investigation and remediation sites since 1998 throughout the state of New Jersey as part of three consecutive task order contracts with the NJDEP. This includes recent archaeological investigation and wetland restoration work at Higbee Beach and Mad Horse Creek WMAs.

Geo-Sci's General Manager, Dr. Dan Wagner, has worked as a consulting pedologist throughout eastern North America, Central America, and the Caribbean for 42 years. He has either directed or contributed to some 1,700 projects, including nearly 810 geoarchaeological studies. Dr. Wagner has also worked on a number of prehistoric and historic sites interpreting landscape modifications for settings ranging in diversity from eighteenth Century Tidewater plantations to the altered shorelines and core areas of most of the major East Coast cities. He will be supported by Dr. Darrin Lowery, who has served as the principal investigator on more than 50 broad-scale interior-field or coastal-shoreline phased geoarchaeological surveys and site specific excavations during his 26 years of experience.

NJDEP / Cape May County, NJ

Higbee Beach Wetland Restoration Project

Louis Berger was contracted by the NJDEP to implement this multi-phased tidal marsh restoration and redevelopment project for a marine ecosystem located along the Delaware Bay in Cape May County, New Jersey. The project is implemented through the Office of Natural Resource Restoration (ONRR) and will result in the restoration of several hundred acres of salt marshes within the Pond Creek watershed, the restoration of approximately 35 acres of maritime forest, coastal dunes, and early successional forest, and the redevelopment of the former Harbison Walker magnesite plant site. Recreational and educational opportunities will be incorporated into the design.

The project goal is to reestablish tidal inundation to a large portion of Pond Creek marsh without increasing the flood risk to the upper watershed or inundating the eastern marsh area, and allowing for habitat management of the northern marsh area. Louis Berger planned and conducted baseline studies to support the conceptual design development, including vegetation identification, habitat mapping, wetland delineations, biological benchmark (bio-benchmark) assessment, salinity screenings, reference marsh assessment, fishery resources identification, topographic and bathymetric surveys, and hydrologic, hydraulic, and hydrodynamic modeling. Through an iterative process of defining, modeling, and refining the design through stakeholder input, Louis Berger developed a conceptual plan that includes marsh restoration through inlet modification with a berm to maintain flood protection to the upper watershed and to allow habitat management of the northern marsh area.

Louis Berger is currently executing tasks to support permit application development and final design, which will include full design of the marsh restoration, berms, and associated water control structures; design of over 35 acres of maritime forest/upland restoration, bridge design to provide access over the restored inlet channel, the design of nature trails, the architectural design of three wildlife viewing blind designs that will be sited at six locations within the WMA, interpretive signage and other recreational features, and preliminary site design of a proposed educational facility or interpretive center within a former manufacturing plant.

Louis Berger has also conducted systematic archaeological testing in all undisturbed portions of the archaeological survey area. One late nineteenth-to mid-twentieth-century bottle dump was identified. Louis Berger concluded that the proposed project would have no effect on any significant archaeological resources.

Studies included an extensive threatened and endangered species survey, floristic quality assessment (including vegetation surveys and habitat classification) and quantification of ecological uplift projected for project implementation. Detailed hydrodynamic modeling spanning five months was conducted to assess inlet stability, tidal flushing, scour analysis and channel migration.

FIRM
Louis Berger

PERIOD OF PERFORMANCE
2013 - ongoing

KEY PERSONNEL
- Lauren Hayden, RPA, ENV SP
- Justin Baker, PWS, CE, CERP

RELEVANT FEATURES
- Higbee Beach WMA site
- Phase I Archaeological Study
- Coastal Wetland Field Investigation, Survey, Analysis, and Reporting
- Plant Community Surveys

NJDEP / Salem County, NJ

Mad Horse Creek Wetland Restoration Project

Louis Berger was selected by the NJDEP and National Oceanic and Atmospheric Administration (NOAA) to aid in the restoration of a 188-acre area located adjacent to the Delaware Bay in Salem County, New Jersey. In coordination with the NOAA, NJDEP, and U.S. Fish and Wildlife Service (USFWS), Louis Berger completed baseline technical studies, including characterizing the existing ecological, hydrological, and geotechnical conditions of the site. The firm developed the final engineering plans and specifications to restore tidal wetlands, freshwater wetlands, and coastal grasslands in an area currently used for agricultural purposes.

The site is being restored as partial compensation for the 250,000 gallon oil spill caused by the grounding of the merchant marine oil tanker Presidente Rivera in the Delaware River in 1989. River and tidal currents spread the spill approximately 30 miles along the Delaware River affecting New Jersey, Pennsylvania, and Delaware. Impacts caused by the spill included park and fishery closures, and oil deposits along the coastal wetlands and shoreline. Using restoration funds, the site was purchased by the State of New Jersey in 1998. This site is located amongst one of the richest remaining reserves of wilderness in New Jersey, providing a rich mosaic of year-round habitat for a wide variety of marine and terrestrial plants, animals, and natural communities. The restoration project will expand estuarine salt marshes and tidal creeks; establish freshwater wetlands and vernal pools; restore coastal grassland communities; and create natural buffers to existing agricultural and transportation uses in the area. Several baseline studies were conducted to support the restoration design.

Louis Berger conducted a Phase I cultural resource survey under Section 106 of the National Historic Preservation Act (NHPA) of 1966. As part of the survey, Louis Berger completed a Phase I archaeological survey of the approximately 74-hectare (182-acre) proposed area of disturbance in the upland portion of the area of potential effect (APE). The survey, consisting of a mix of pedestrian survey and shovel test excavation, identified a broad distribution of nineteenth century historic period artifacts, two Pre-Contact period concentrations, and five loci of eighteenth century artifacts. One historic locus corresponded to a previously identified site, the Alloway Creek Neck Road site (28-Sa-190). Project plans were redesigned to avoid impacting the six loci. A Phase II archaeological site evaluation was conducted at one of the eighteenth century loci as a representative sample of the historic period archaeological sites.

The Phase II archaeological site evaluation recovered 2,710 artifacts, with 92 percent (n=2,492) recovered from the house and associated yard area. An additional 218 artifacts were recovered from outlying units and represent the general density of artifacts found across the site. In addition to the house cellar deposits, sufficient architectural materials were present to indicate that the former house was built in the local "patterned brick" tradition, with occasional glazed brick mixed in with the red brick debris that was densest in the cellar feature. On the basis of the Phase II site evaluation, it was Louis Berger's opinion that the site contains significant historic resources eligible for listing in the NRHP/NJHP.

FIRM
Louis Berger

PERIOD OF PERFORMANCE
2013 - ongoing

KEY PERSONNEL
- Lauren Hayden, RPA, ENV SP
- Justin Baker, PWS, CE, CERP
- Delland Gould
- Tracey Jones

RELEVANT FEATURES
- Phase I/II Archaeological Studies
- Section 106 Consultation
- Coastal Wetland Field Investigation, Survey, Analysis, and Reporting

NEW JERSEY TURNPIKE AUTHORITY / Cape May County, NJ

Garden State Parkway Interchanges 9, 10, and 11 Improvement Project

Louis Berger provided engineering and environmental services for the New Jersey Turnpike Authority (NJTA), Garden State Parkway (GSP) Division, for the GSP Interchanges 9, 10 and 11 Improvements Project in the Township of Middle, Cape May County, New Jersey. As part of this effort, Louis Berger conducted Phase I, II, and III archaeological investigations.

Archaeological data recovery (Phase III) was conducted at four sites (28-CM-58, 28-CM-59, 28-CM-60, and 28-CM-62). This entailed excavation of 90 1x1-meter test units. In addition, 220 shovel tests were excavated at Sites 28-CM- 59 (153 tests) and 28-CM-60 (67 tests) to better define the sites' boundaries and to clarify artifact distributions across the sites. The shovel test results informed the placement of the 1x1-meter units. A total of 3,143 artifacts (plus 5,024 faunal and floral items) were recovered from the units and shovel tests excavated at the four sites in the data recovery. A total of 3,888 artifacts, 5,834 faunal remains, and 34 floral samples were recovered as a result of all investigations.

Multiple prehistoric components were recognized in mixed deposits at each site. Most noteworthy was recovery of the base of a Barnes-like Paleoindian fluted point at Site 28-CM-60. A radiocarbon date of 800±30 rcybp (cal AD 1190 to 1270), coincides with the Late Woodland occupation indicated by Minguannan/Overpeck potsherds. Sherds and a Fox Creek Stemmed point found at Site 28-CM-58 indicate two distinct (Middle and Late Woodland) occupations. Diagnostic artifacts indicated multiple prehistoric occupations at 28-CM-62. A quahog shell from Feature 1 at Site 28-CM-62 was dated to 1230±40 rcybp. Making allowance for the marine reservoir effect, this date calibrates as ca. cal AD 1185. Historic artifacts indicate occupation of this site beginning in the early eighteenth century, and radiocarbon dates on shells and charcoal samples from features indicate historic-era disposal.

The faunal remains recovered from all sites consist mainly of shells of clam and oyster. Analysis of the developmental history of the tidal marshes east of the sites suggests that shellfish might have been available as early as 4500 cal BP and were definitely present by cal AD 300. In the report completed in 2017, these data were used to address several broad research questions, including the chronology of prehistoric occupations and shellfish harvesting at each site, year-round or seasonal prehistoric occupation of the Atlantic coast, marine reservoir effects on radiocarbon dating, and more specific historical associations of the eighteenth-century occupation at Site 28-CM-62.

Louis Berger also provided extensive environmental baseline investigations and impact assessments for natural resources to support the preparation of a Feasibility Assessment Report and a NEPA Environmental Assessment (EA) for three intersection improvements along a 6-mile corridor. Louis Berger managed the development of NJDEP Freshwater Wetlands and Coastal Wetlands permits and coordinated mitigation bank credit purchase and development of Mitigation Plans for Wetlands, Critical Habitat, No-Net-Loss Reforestation, and Riparian Zones.

FIRM
Louis Berger

PERIOD OF PERFORMANCE
2010 - 2017

KEY PERSONNEL
- Lauren Hayden, RPA, ENV SP
- Stuart Fiedel, PhD
- Justin Baker, PWS, CE, CERP

RELEVANT FEATURES
- Phase I-III Archaeological Studies
- Plant Community Surveys
- Threatened and Endangered (T&E) Species Habitat Assessments

C&O Canal National Historical Park Archaeological Identification and Evaluation

The Chesapeake & Ohio (C&O) Canal National Historical Park is one of the largest parks in the National Capital Region, extending from Georgetown in the District of Columbia, just below the falls of the Potomac, upriver and deep into the heart of the Appalachian Mountains to Cumberland, Maryland. With more than 180 miles of Potomac River frontage, C&O Canal park lands have attracted both prehistoric Native Americans and historic settlers. Louis Berger, in coordination with Geo-Sci, completed a nine-year archaeological survey program of the C&O Canal Park under the aegis of the Systemwide Archeological Inventory Program (SAIP).

The nine-year study was divided into three separate three-year studies, each one focused on one segment of the park. The project included documentary and cartographic research; geoarchaeological testing; examination of artifact collections; informant interviews; archaeological field investigations; and laboratory processing and analysis. More than 80 new archaeological sites were recorded during the project. These included Native American camps and settlements dating back nearly 11,000 years, colonial farms, iron mines, mills, stores, Civil War fortifications, and sites associated with the operation of the canal, such as workshops and lock-keepers' houses. The locations and boundaries of numerous other, previously identified sites were refined. Extensive historical research clarified the colonial history of the Potomac valley, overturning certain assumptions that had been incorporated into the standard narrative history of the park and the region.

Because the project area includes terraces along the Potomac River, geomorphological studies were part of the research design from the start, and much was learned about how the river has developed over the past 13,000 years. Because the ways people used the river and the places they chose to put their settlements responded to changes in the river and its valley, this study also helped the team learn about the human past. A number of radiocarbon assays were determined for charcoal samples with dates ranging from Early Archaic to late Woodland. Where datable materials were not present, age assignments were based on soil morphology and the degree of subsoil development.

Among the most important discoveries during the project were several deeply stratified prehistoric sites, one with deposits spanning the period from 9000 BC to AD 1000. Such sites are vital for learning more about the prehistory of North America, since only in such sites can cultural developments over time be clearly seen. Investigation of some of these sites was carried out using an innovative method. To reach the lower deposits without endangering the excavators, a "staircase" was dug into the river bank, exposing a continuous stratigraphic profile across the three-step excavation.

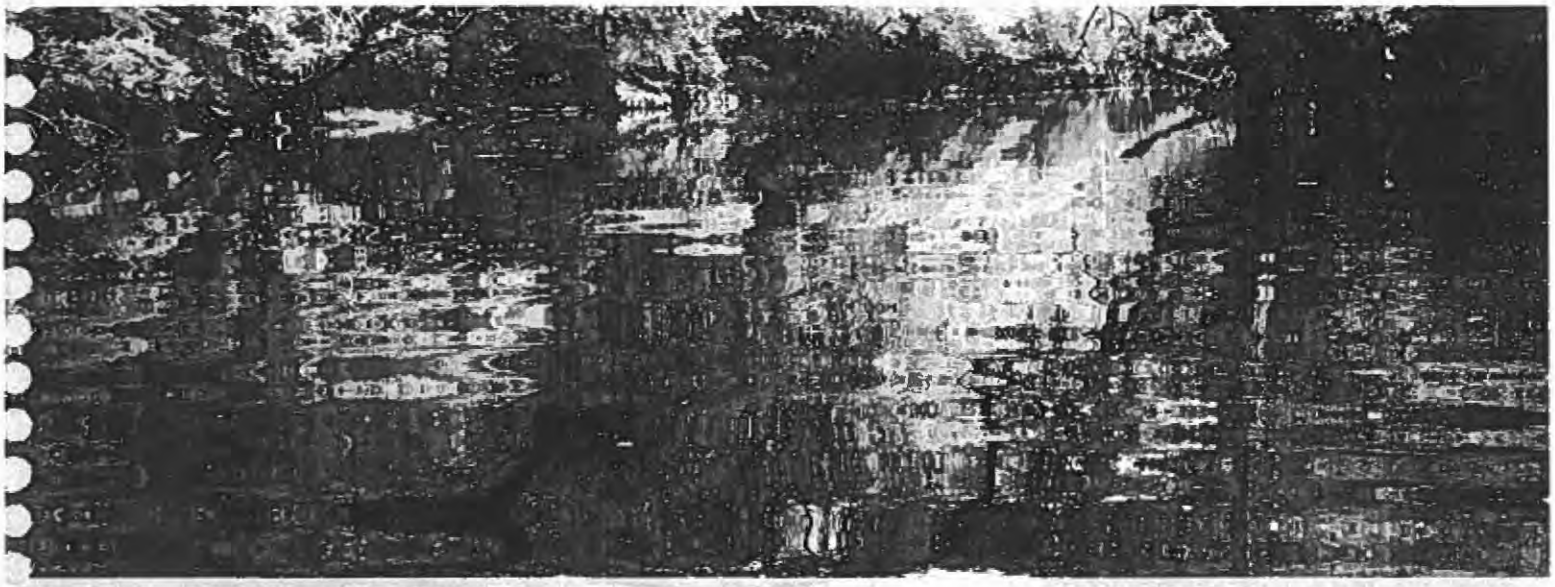
The data from the study were delivered to the NPS in several ways. The technical reports were written in two volumes; the first volume was a narrative written for interpretive staff and the general public, while the detailed information needed by archaeological professionals and park managers was presented in Volume II. Louis Berger has also provided guides for law enforcement personnel, and text for web sites and brochures. All spatial data, such as the locations of test pits and the boundaries of sites, was delivered to the NPS in the form of GIS layers, so archaeological information can be more easily integrated into the park's planning process.

FIRM
Louis Berger and Geo-Sci

PERIOD OF PERFORMANCE
2002 - 2010

KEY PERSONNEL
- Stuart Fiedel, PhD
- Dan Wagner, PhD
- Delland Gould

RELEVANT FEATURES
- Archaeological and Geomorphological Investigation
- Prehistoric Sites



U.S. NAVY / Marine Corps Base Camp Lejeune, NC

Stones Creek and Bear Garden Game Lands Phase I Archaeology Survey

Louis Berger, as a subconsultant, carried out a Phase I archaeological survey of 990-acres of state-owned game lands just outside Marine Corps Base Camp Lejeune part of a plan to establish habitat for red-cockaded woodpeckers. The survey areas consisted mostly of pine-dominated coastal plain forest. During the survey, more than 2,000 shovel tests were excavated and 27 archaeological sites were defined. The sites consisted of small prehistoric camps; tenancies dating to the nineteenth and early twentieth centuries; one mill; and an earthwork that might possibly date to the Revolutionary War, when there was skirmishing in this area.

One portion of the project area consisted of stream terraces along Holly Shelter Creek, just upstream from its confluence with the Cape Fear River. To investigate the possibility that stratified archaeological sites might be present on these terraces, a program of soil augering was carried out. Twenty-three auger tests were made, with depths of 70 to 276 centimeters. The testing led to the characterization of two distinct landforms, a higher terrace dating to the Pleistocene and a lower terrace dating to early Holocene or very late Pleistocene times. The soils of the later terrace were all shallow, less than one meter. Therefore shovel testing was sufficient to locate all likely prehistoric archaeological tests in this environment. In fact, all of the sites discovered were limited to the top 30 centimeters of the profile.

Due to the short turnarounds on the management summary deliverables for this project, Louis Berger archaeologists, GIS professionals and managers reported findings on a weekly or bi-weekly basis as the field effort was ongoing. This involved processing GPS files, field summaries, artifact analysis, and other data for several project area segments that each required individual memorandum-format deliverables and mapping during the three month field effort.

FIRM
Louis Berger

PERIOD OF PERFORMANCE
2017 - 2018

KEY PERSONNEL
- Stuart Fiedel
- Delland Gould

RELEVANT FEATURES
- Phase I Archaeological Study
- Coastal Survey Area
- Met an Aggressive Schedule

NATIONAL PARK SERVICE / Washington, DC

Archaeological Overview and Assessment of Anacostia Park and Kenilworth Gardens

The Anacostia River was a major focus of settlement for ancient Native Americans, and the seventeenth-century Indian town of Nacotchtank was built along its shore. The river's east bank was also the first part of the District of Columbia settled by Europeans. In more recent times the area has seen industrial development and the camp of the "Bonus Marchers" who descended on Washington in 1932 to demand bonuses they thought they had been promised for service in World War I. Archaeological research along the river valley began in the 1870s, and the Smithsonian Institution maintains collections from the valley that hold thousands of ancient Indian artifacts. Anacostia Park and Kenilworth Gardens therefore have, broadly speaking, a very high potential for both historic and prehistoric sites.

The Overview and Assessment study undertaken by Louis Berger included review of 33 previous archaeological reports, examination of thousands of artifacts in the collections of the Smithsonian Institution, detailed historical research, and a concerted attempt to model how the landscape has changed over the past few thousand years. The artifacts dated mainly to the Terminal Archaic through Late Woodland periods, although there was some earlier material.

Geo-Sci assessed various landforms and soils within Anacostia Park for their respective cultural resource potentials during the summer and fall of 2015. All field work was coordinated with the Louis Berger archaeological staff. Soils were initially examined by hand auger borings which were then followed-up with Geoprobe borings where deep fill prevented hand augering. Combined, these totaled 26 soil examinations. The findings were also supplemented with 36 other soil examinations from earlier studies, since over the years the firms have completed a number of other projects at locations near the park, some dating back more than 30 years.

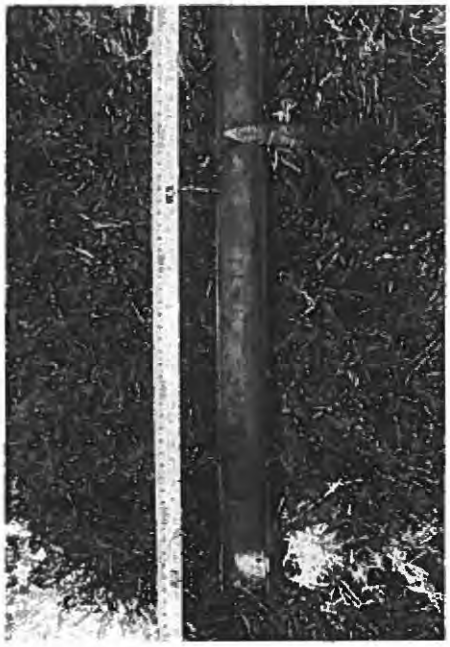
Over the course of these projects, the park was found to have three major land types: Coastal Plain uplands, a low Coastal Plain terrace, and artificially made land. Uplands were found to be mostly so disturbed that little cultural potential existed. The most extensive land within the park was found to be artificially made, with filling of the river extending to as much as 1,000 ft at some locations. Based on historic mapping, many of the soil examinations were specifically located near original shorelines along the low terrace. However, this terrace with the greatest archaeological potential of the park landforms was encountered in only five examinations. One of these was at a known but previously only loosely located site, and another resulted in a new site identification. Based on this study, as well as other observations along the east sides of both the Anacostia and Potomac Rivers, soil morphology documents a terrace soil age correlating with the Pleistocene to Holocene transition.

FIRM
Louis Berger and Geo-Sci

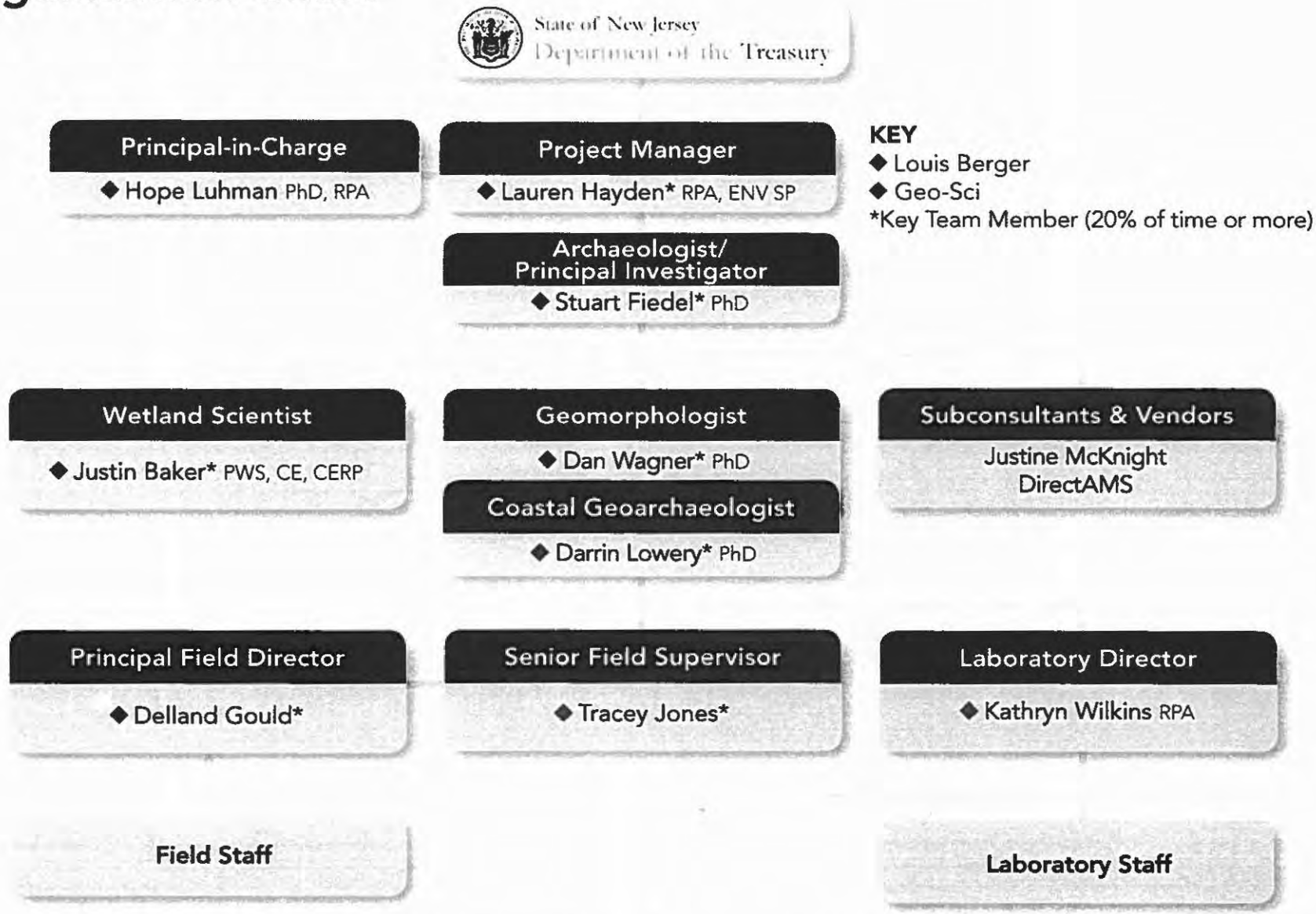
PERIOD OF PERFORMANCE
2015 - 2016

KEY PERSONNEL
- Stuart Fiedel, PhD
- Dan Wagner, PhD

RELEVANT FEATURES
- Archaeological Assessment
- Multiple Soil Examinations
- Prehistoric Site



B Organization Chart



Louis Berger will lead the archaeological investigation and is prequalified by DPMC to provide such services.

C Resumes of Key Team Members

Resumes for the Louis Berger Team's key team members spending 20% or more of their time on any phase of the project are attached on the following pages.

Project Manager

Lauren Hayden RPA, ENV SP

Ms. Hayden has 19 years of experience conducting archaeological investigations at prehistoric sites dating to the Paleoindian through the Late Woodland periods and historic sites dating to the eighteenth through the early twentieth centuries throughout the Northeast, Southwest, and Southeast. As an archaeologist, she has been responsible for implementing surveys and excavations, performing background and site-specific research, and analyzing and interpreting archaeological data and artifacts for more than 50 projects in the Northeast. Ms. Hayden specializes in preparing technical reports and agreement documents in compliance with Section 106 of the National Historic Preservation Act (NHPA), Section 4(f) of the Department of Transportation Act, the National Environmental Policy Act (NEPA) of 1969, and state and local regulations. She has managed and/or supervised archaeological surveys for more than 20 projects in the Northeast, including recent work at Higbee Beach WMA.

FIRM
Louis Berger

EDUCATION
- MA, Anthropology
- BA, Anthropology

REGISTRATIONS / CERTIFICATIONS
- Accredited by the Register of Professional Archaeologists
- Envision Sustainability Professional

YEARS EXPERIENCE
19

New Jersey Department of Environmental Protection (NJDEP) Office of Natural Resource Restoration (ONRR), Higbee Beach Restoration Project, Cape May County, New Jersey. Archaeologist. Supervised Phase I archaeological survey in association with the restoration of the salt marshes within the Higbee Beach WMA. Responsible for background research, fieldwork, and report preparation.

NJDEP, ONRR, Mad Horse Creek Wetlands Restoration Project, Salem County, New Jersey. Archaeologist. Phase I cultural resource survey for the restoration of 230 acres of tidal marsh, forest, grassland, and emergent freshwater marsh in Salem County. Responsible for background research, supervision of fieldwork, and report preparation.

New Jersey Turnpike Authority (NJTA), Garden State Parkway Interchanges 9, 10, and 11 Improvement Project, Phase I - III Cultural Resource Surveys, Cape May County, New Jersey. Archaeologist. Cultural resource services associated with environmental compliance on three new interchanges on the National Register-eligible Garden State Parkway in Cape May County. Assisted with background research, fieldwork, report preparation, and memorandum of agreement (MOA) compliance.

County of Cape May, Green Creek Tidal Estuary Sustainability Project, Phase IA Cultural Resource Survey, Middle Township, Cape May County, New Jersey. Archaeologist. Supervised Phase IA cultural resource survey of the 1,275-acre proposed project area, focusing on the limits of proposed ground disturbance.

New York State Government Office for Sandy Recovery (GOSR), Gorge Creek Site 1 (09542.000116) Project, Phase III Data Recovery, Village of Middleburgh, Schoharie County, New York. Project Manager. Phase III data recovery of the National Register–eligible Gorge Creek Site 1 (09542.000116).

Atlantic City Electric, Lewis-Higbee/Ontario 69kV Transmission Line Rebuild Project, Phase I Cultural Resource Investigation, Atlantic County, New Jersey. Archaeologist. Supervised Phase I cultural resource investigation for the proposed rebuild of the existing Lewis-Higbee/Ontario 69kV transmission line. Archaeological investigation included shovel test excavation and a limited geomorphological survey. Conducted Phase IA investigations, oversaw Phase IB survey, and co-authored report.

PPL Electric Utilities, Inc. (PPL), and Public Service, Electric and Gas, Susquehanna to Roseland 500kV Transmission Project, Phase I/II Cultural Resource Investigations, Delaware Water Gap National Recreation Area (DEWA), Monroe County, Pennsylvania, and Warren County, New Jersey. Archaeologist. Cultural resource survey of the portions of the transmission project extending through DEWA as part of the Section 106 process. Identified and evaluated 25 prehistoric and/or historic archaeological sites and historic architectural resources (including the Appalachian Trail) in DEWA. Archaeological investigations included pedestrian survey, shovel test, test unit, slot trenches, and a geomorphological investigation. Supervised Phase II investigations, produced graphics, and co-authored report.

Archaeologist / Principal Investigator

Stuart Fiedel PhD

Dr. Fiedel supervises archaeological research projects involving prehistoric and historic resources. He plans and conducts surveys, evaluations, and excavations of historic and prehistoric sites. Dr. Fiedel has published numerous scientific articles in the field of North American prehistoric archaeology. His experience includes projects in the Northeast, including New Jersey. Dr. Fiedel is a registered Professional Archaeologist and meets the Secretary of the Interior's Minimum Professional Qualifications Standards for Archaeology.

FIRM
Louis Berger

EDUCATION
- PhD, Anthropology
- BA, Anthropology

YEARS EXPERIENCE
40

NJTA, Garden State Parkway Interchanges 9, 10, and 11 Improvement Project, Phase I - III Cultural Resource Surveys, Cape May County, New Jersey. Co-Author of Report. Cultural resource services associated with environmental compliance on three new interchanges on the National Register-eligible Garden State Parkway in Cape May County.

National Park Service (NPS), Chesapeake & Ohio (C&O) Canal National Historical Park Archaeological Identification and Evaluation Study, Maryland. Co-Principal Investigator. Miles 0-59 (Rock Creek to Sandy Hook) and 59-123 (Sandy Hook to Hancock). Responsible for archival research, surface reconnaissance, unit excavations, and surveys.

New York State GOSR, Gorge Creek Site 1 (09542.000116) Project, Phase III Data Recovery, Village of Middleburgh, Schoharie County, New York. Principal Investigator. Phase III data recovery of the National Register-eligible Gorge Creek Site 1 (09542.000116).

Stones Creek Bear and Garden Game Lands, Phase I Archaeological Study, Marine Corps Base Camp Lejeune, North Carolina. Ceramic Analyst.

NPS, Upper Delaware Scenic and Recreational River Overview and Assessment, Pennsylvania. Principal Investigator. Focused on four discrete parcels comprising 30.8 acres; created context for evaluation of archaeological resources.

Churchill and Banks (Riverfront Business Park LLC), Phase I Archaeological Survey, Freetown, Massachusetts. Principal Investigator. Multiple prehistoric loci were identified by shovel testing along the Taunton River.

Panama Canal Authority, Panama Canal Dredge Disposal Project, Cultural Resources Assessment, Panama. Cultural Resource Specialist. Developed predictive model of locations of prehistoric and historic sites in proposed canal expansion zone.

U.S. Department of the Navy, Engineering Field Activity Chesapeake, Phase I and II Cultural Resource Investigations, Russell Road, Marine Corps Base Quantico, Prince William County, Virginia. Co-Principal Investigator. Evaluated two prehistoric sites along Chopawamsic Creek by means of shovel tests and units.

Excavation of Archaic and Woodland Shell Midden, Teller's Point, New York. Project Director.

Marshlands Conservancy, Surface collection, Coastal Archaic and Woodland Sites on Shoreline of Long Island Sound, Rye, New York. Project Director.

State University of New York, College at Purchase. Assistant Professor.

Papers and Articles:
Orient Fishtail Points from the Rye Marshlands Conservancy. Bulletin of the Archaeological Society of Connecticut 51:111-124. 1988.

Gone with the Waves? The Archaeological Potential of the North American Coasts. Invited presentation to The Coastal Society and NOAA. Washington, DC, March 28, 2005.

Wetland Scientist

Justin Baker PWS, CE, CERP

Mr. Baker is a wetland scientist with 18 years of experience, including wetland delineations; stream origin determination and delineation; wetland restoration; wetland mitigation design and monitoring; watershed assessments; habitat mapping and assessments; threatened and endangered species surveys; vegetation mapping; performing environmental assessment (EA) tasks for regulatory agency clients; water quality monitoring; riparian land cover mapping; Geographic Information Systems (GIS) mapping and analysis; best management practice (BMP) design and implementation; as well as public outreach. Mr. Baker is an expert in the field of wetland delineation, wetland functional assessments, as well as wetland mapping and identification. He has vast experience working with wetland mitigation and restoration, including recent work at Higbee Beach WMA. Prior to joining Louis Berger, Mr. Baker studied coastal wetland restoration efforts in Louisiana; performed wetland resource management in coastal Mississippi and in the Everglades; and performed river and stream environmental monitoring for state entities in coastal North Carolina. He has also worked extensively in numerous wetland systems including salt, brackish, and freshwater marshes, bottomland hardwood swamps, and scrub-shrub wetlands.

FIRM
Louis Berger

EDUCATION
- MS, Biology
- BS, Environmental Science

REGISTRATIONS / CERTIFICATIONS
- Professional Wetland Scientist
- Certified Ecologist
- Certified Ecosystem Restoration Practitioner

YEARS EXPERIENCE
18

NJDEP, ONRR, Higbee Beach Restoration Project, Cape May County, New Jersey. Senior Scientist. Responsible for conducting intensive baseline studies and helping develop conceptual design for the restoration of the salt marshes within the Higbee Beach WMA. Baseline studies include: Wetland delineation; Habitat mapping; Maritime Forest Assessment; Wetland Functional Assessment – including Evaluation for Planned Wetland (EPW) Assessment, and Floristic Quality Assessment; and Threatened and Endangered Species Habitat Assessment and Surveys. Responsible for development of Functional Assessment Report. Assisted with state and federal permit package preparation. Science lead responsible for assisting with restoration design and ecological evaluation.

NJDEP, ONRR, Mad Horse Creek Wetland Restoration Project, Salem County, New Jersey. Senior Scientist. Assisted design team in developing wetland restoration design for freshwater and tidal areas within the Mad Horse Creek WMA. Responsibilities included conducting wetland delineation of approximately 260 acre site comprised of coastal freshwater wetlands, forested wetlands, and tidal emergent wetlands. Responsible for preparing state and federal permit package.

NJTA, Garden State Parkway Interchanges 9, 10, and 11 Improvement Project, Wetland Delineation, Cape May County, New Jersey. Senior Scientist. Assisted with the completion of a wetland delineation along the length of the Garden State Parkway encompassing Interchanges 9, 10, and 11, as well as auxiliary roads and parcels, pursuant to the procedures outlined in the U.S. Army Corps of Engineers' (USACE) Wetlands Delineation Manual (Environmental Laboratory, 1987) and the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands. Assisted with potential mitigation site search and was responsible for generating GIS maps.

Friends of Herring River, Herring River Restoration Project, Environmental Impact Statement/Environmental Impact Report (EIS/EIR), Wellfleet, Massachusetts. Senior Scientist. Prepared a Wetland Delineation Summary Letter documenting all information obtained during the field investigation, including surface water features, vegetation, soils, and hydrology descriptions for each wetland identified, and input regarding permit requirements. The Herring River project involves the restoration of self-sustaining coastal habitats throughout the 1,100-acre Herring River estuary in Wellfleet and Truro, Massachusetts.

New York State Department of Environmental Conservation (NYSDEC), Natural Resource Inventory and Assessment of Conservation Priorities of the Binnen Kill and its Tidal Habitats, Selkirk, New York. Senior Scientist. Responsible for conducting a wetland functional assessment; reviewing the initial field data and habitat mapping; and determining the location and extent of wetland and upland Assessment Areas in accordance with the EPW procedures and protocols adopted by the New York District of the USACE for the application of EPW to restoration projects.

Geomorphologist

Dan Wagner PhD

Dr. Wagner has served as Senior Soil Scientist and General Manager of Geo-Sci Consultants from 1983 to the present, and prior to this he was Senior Pedologist and President, Soil Resource Analysts, Inc., 1976 to 1983. In this capacity he has worked as a consulting pedologist throughout eastern North America, Central America, and the Caribbean for 42 years. Dr. Wagner has either directed or contributed to some 1,700 projects, including nearly 810 geoarchaeological studies. Most of the latter involved paleogeographic analyses of prehistoric sites emphasizing late Pleistocene through Holocene depositional and soil weathering sequences, as well as evolving environmental conditions. He has also worked on a number of historic sites interpreting landscape modifications for settings ranging in diversity from eighteenth Century Tidewater plantations to the altered shorelines and core areas of most of the major East Coast cities. Professional societies to which Dr. Wagner belongs include: the Eastern States Archeological Federation, Middle Atlantic Archaeological Conference, American Quaternary Association, and Mid-Atlantic Association of Professional Soil Scientists, for which he was an organizer and founding member. Dr. Wagner has presented numerous professional papers at both earth science and archaeological meetings, and has authored or co-authored 51 professional publications. During the years 1991 to 2004, he was a Faculty Associate of Johns Hopkins University, where he taught an environmental soils course, and he is presently a Research Associate with the Smithsonian Institution, a position he has held since 2010.

FIRM
Geo-Sci Consultants

EDUCATION
- PhD, Soil Science
- MA, Soil Science
- BA, Soil Science

YEARS EXPERIENCE
42

Geoarchaeology of Anacostia Park (subconsultant to Louis Berger), Washington, DC. Principal Geoarchaelologist/Pedologist. Characterization of landforms and disturbance assessments with regard to cultural resources were made along a 5-mile length of the tidal Anacostia River.

Soil Disturbance Assessment of a Potomac River Terrace (subconsultant to Louis Berger), Joint Base Anacostia-Bolling, Washington, DC. Principal Geoarchaelologist/Pedologist. Soil integrity was assessed with regard to cultural resources at multiple locations across the base.

Geoarchaeology of Patuxent River Naval Air Station (subconsultant to Louis Berger), St Mary's County, Maryland. Principal Geoarchaelologist/Pedologist. Landforms and soils were examined at numerous locations to provide overall assessments of archaeological potentials throughout this roughly 7,000-acre base adjacent to the tidal Patuxent River.

Soil Characterizations Along Two Miles of a Schuykill River Terrace (subconsultant to CHRS, Inc.), Birdsboro, Pennsylvania. Principal Geoarchaelologist/Pedologist. Soil examinations were made to assess potentials for buried pre-Contact cultural resources.

Geoarchaeology of Poplar Point (subconsultant to Commonwealth Heritage Group, Inc.), Washington, DC. Principal Geoarchaelologist/Pedologist. Detailed soil descriptions and other characterizations were made for a deeply buried (23 ft) pre-Contact site adjacent to the tidal Anacostia River.

Geoarchaeology of Sugarhouse Casino (subconsultant to A.D. Marble, Inc.), Philadelphia, Pennsylviania. Principal Geoarchaelologist/Pedologist. Soils were examined as a means of delineating natural land from made land along the altered shoreline of the tidal Delaware.

Geoarchaeology of Glassboro-Camden Line (subconsultant to A.D. Marble, Inc.), Gloucester County, New Jersey. Principal Geoarchaelologist/Pedologist. Soils and landforms were examined at multiple locations between these two cities to assess potentials for pre-Contact cultural resources.

Coastal Geoarchaeologist

Darrin Lowery PhD

Dr. Lowery's first professional archaeological and/or coastal geoarchaeological project was with a survey of Kent Island in Maryland, which was conducted in 1992. Since 1992, he has served as the principal investigator on more than 50 broad-scale interior-field or coastal-shoreline phased geoarchaeological surveys and site specific excavations. He has discovered and documented 1920 archaeological sites within Middle Atlantic region; systematically surveyed and evaluated over 2973 linear miles of coastline for eroded and drowned archaeological sites; and systematically surveyed and evaluated 91,241 acres of agriculturally-tilled fields on the Delmarva Peninsula for archaeological sites. Since 1991, Dr. Lowery has received 64 grants and contracts to conduct archaeological-geological investigations totaling $1,514,682.67. He has authored or co-authored 51 research-compliance monographs and 52 peer-reviewed academic publications. From 2009 to 2010, Dr. Lowery received a pre-doctoral fellowship from the Smithsonian Institution to conduct a regional syntheses of Paleoindian coastal archaeological site formation processes. From 2013 to 2014, he received a post-doctoral fellowship from the Smithsonian Institution to conduct isotopic analyses to investigate the origin of prehistoric marine shell ornaments.

FIRM
Geo-Sci Consultants

EDUCATION
- PhD, Geoarchaeology-Geology
- MA, Archaeology-Anthropology
- BA, Anthropology

YEARS EXPERIENCE
26

Maryland Historical Trust, Coastal Geo-Archaeological Investigation of the Honga River Watershed, Dorchester County, Maryland. Geoarchaeologist.The project was designed to re-evaluate all 36 recorded coastal archaeological sites and assess the current condition of these eroding archaeological sites. An additional 34 new or previously unrecorded sites were located during the survey of 91 linear miles of coastline. Since many of the sites were drowned, a secondary goal of the project was to assess the site formation processes associated with late Holocene marine transgression.

Virginia Department of Historic Resources (DHR), Coastal Archaeological Survey and Shoreline Erosion Assessment of Accomack and Northmapton Counties, Virginia. Geoarchaeologist. The project was designed to reevaluate all 243 coastal archaeological sites and assess the current condition of these eroding archaeological sites along 1289 linear miles of coastline. The project was intended to address the nearshore site formation processes within the Chesapeake Bay and along the Atlantic coastline. GIS historic map and aerial imagery overlays were prepared to evaluated rates of erosion/ accretion. Stratigraphic and geomorphological profiles were prepared and radiometric analyses were conducted to better understand late Holocene marine transgression.

Virginia DHR, Coastal Archaeological Survey Back Bay, Virginia. Geoarchaeologist. The project was designed to reevaluate 11 coastal archaeological sites and assess the current condition of these eroding archaeological sites within Back Bay; a barrier island lagoon setting along Virginia's Atlantic coastline. Stratigraphic and geomorphological profiles were prepared to understand the regional site formation processes.

Virginia DHR, Coastal Archaeological of the Lower York River, Virginia. Geoarchaeologist. The project was designed to reevaluate 17 coastal archaeological sites and assess the current condition of these eroding archaeological sites along the lower reaches of the York River; a tributary of the Chesapeake Bay. Stratigraphic and geomorphological profiles were prepared to understand the regional site formation processes. Benchmarks were installed to assess and evaluate future changes to the shorelines at each site.

Virginia DHR, Historic Forested Hummock and Tidal Marsh Geoarchaeological Investigation of Recent Sea Level Rise, Virginia. Geoarchaeologist. The project incorporated historic map, aerial imagery, archaeological data, and soil profiles to evaluate rates of relative sea level rise sea level rise in the Chesapeake Bay over the past 170 years.

Virginia DHR, Coastal Geoarchaeological Investigations at the Upper Ridge Site, a drowned prehistoric site along Virginia's Atlantic sea coast. Geoarchaeologist. The project focused on assessing the natural processes impacting archaeological sites impacted by sea level rise.

Principal Field Director

Delland Gould

As a principal field director, Mr. Gould is responsible for project planning, archaeological 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.

FIRM
Louis Berger

EDUCATION
- MS Candidate, Geoscience
- BA, Sociology and Anthropology

YEARS EXPERIENCE
27

NJDEP, ONRR, Mad Horse Creek Wetland Restoration Project, Salem County, New Jersey. Principal Field Director. Phase II evaluation of an 18th-century domestic site as part of the restoration of 230 acres of tidal marsh, forest, grassland, and emergent freshwater marsh in Salem County.

New York State GOSR, Gorge Creek Site 1 (09542.000116) Project, Phase III Data Recovery, Village of Middleburgh, Schoharie County, New York. Principal Field Director. Conducted and supervised fieldwork.

NPS, C&O Canal National Historical Park Archaeological Identification and Evaluation Study, Maryland. Senior Field Supervisor. Test excavations at five prehistoric sites and the Thomas Cresap's Fort Site, part of the three-year archeological inventory and assessment study. Also assisted Dr. Timothy Horsley in carrying out high resolution magnetometry at the Shawnee Oldfields Site.

Stones Creek Bear and Garden Game Lands, Phase I Archaeological Study, Marine Corps Base Camp Lejeune, North Carolina. Principal Field Director. Conducted and supervised fieldwork.

NPS, Effigy Mounds National Monument Phase I Geoarcheology Survey for the Proposed Replacement of Septic Systems at the Visitor Center and Maintenance/Office Area, Harpers Ferry, Iowa. Project Manager/Principal Field Director. Solid-sediment coring and subsequent hand auger testing of a proposed sewer line replacement project to identify mound deposits for avoidance.

Tennessee Gas Pipeline & Kinder-Morgan, Northeast Energy Direct (NED) Pipeline Project, Pennsylvania, New York, Massachusetts, New Hampshire, and Connecticut. Principal Field Director and Deputy Project Manager. Field assessment, and archaeological survey of proposed pipeline corridor though five northeastern states. Coordinated fieldwork for between 6-40 crew and supervisors, contributed to project-wide archaeological predictive model, state archaeological reports and FERC Resource Reports.

NPS, Jefferson National Expansion Memorial, St. Louis, Missouri. Senior Field Supervisor, Project Geoarchaeologist, and Contributing Author of the technical report. Responsible for geological descriptions of over 40 continuous sediment cores placed throughout the park grounds around the Gateway Arch to identify locations requiring additional archaeological study and develop a generalized geological and geoarchaeological map of the park.

Narragansett Bay Commission, Woonasquatucket and Seekonk CSOI Project, Providence County, Rhode Island. Senior Field Supervisor and Author of technical reports. Archaeological assessment and geoarchaeological investigation of two proposed sewer alignments. Reviewed over 150 boring logs from prior investigations to identify locations of potential archaeological interest and supervised drilling crew. Investigation included continuous sediment coring in 30 locations and deep trenching in three additional locations to identify archaeological deposits and archaeologically sensitive sediments.

New York State Education Department (NYSED), South Rensselaer Port Connector, Alternate C (PIN A031.03.701), Rensselaer County, New York. Senior Field Supervisor. Emplaced over 25 solid-sediment cores to assess potential for deeply buried archaeological sites on the Hudson River floodplain.

Senior Field Supervisor

Tracey Jones

As a field supervisor, Ms. Jones is responsible for daily supervision of archaeological survey, testing, and data recovery projects involving historic and prehistoric resources. Her responsibilities also include site mapping and photography, preparation of state site forms, preparation of projects for curation, writing management summaries, writing and assisting in technical report preparation, and use of Global Positioning System (GPS) survey equipment to record site data. She has experience working in Arizona, Connecticut, Delaware, the District of Columbia, Georgia, Illinois, Iowa, Indiana, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Mississippi, Montana, Nevada, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Puerto Rico, South Carolina, Tennessee, Virginia, Vermont, West Virginia, and Wyoming.

FIRM
Louis Berger

EDUCATION
- BA, Anthropology

YEARS EXPERIENCE
21

NJDEP, Mad Horse Creek, Salem County, New Jersey. Field supervisor. Phase I archaeological survey of approximately 180 acres of farmland in advance of remediation activities. Supervised daily fieldwork, recorded site data with Trimble GPS, and performed site photography.

Tennessee Gas Pipeline & Kinder Morgan, NED Pipeline Project, Pennsylvania, New York, Massachusetts, New Hampshire, and Connecticut.Field Supervisor. Phase I archaeological survey of extensive proposed gas pipeline and associated compressor stations. Supervised daily fieldwork, recorded site and project data with Trimble XT GPS, and performed site photography.

PPL Electric Utilities, Inc. (PPL), Dauphin-Harrisburg Reliability Project, Sunbury-Dauphin 69kV Transmission Line, Dauphin County, Pennsylvania. Field Supervisor. Field investigation of the portion of the transmission line ROW adjacent to previously recorded prehistoric site 36DA0007. Contributed to the technical report.

FirstEnergy, Murry Crest-White Valley 138 kilovolt (kV) Transmission Line Tap to Sunoco Delmont, Westmoreland County, Pennsylvania. Field supervisor. Phase I archaeological survey of a proposed 1.9-mile transmission line.. Contributed to the technical report.

Leidos and Naval Facilities Engineering Command (NAVFAC), Atlantic Division, Naval Auxilary Landing Field, Fentress, Chesapeake, Virginia. Phase I archaeological survey of multiple parcels totaling 221 acres in advance of proposed security improvements at Fentress air field. Supervised daily fieldwork, recorded and mapped site data with a Trimble X7 GPS, and contributed to technical report.

United States Army Corps of Engineers (USACE) Mobile District, and 733D Mission Support Group, Joint Base Langley-Eustis, Fort Eustis, City of Newport News, Virginia. Field Supervisor. Phase II evaluation of one prehistoric site, one historic site, and two multi-component sites located within base training areas. Supervised daily fieldwork, recorded and mapped site data and Trimble XT GPS, and contributed to technical report.

U.S. Army Environmental Command (USAEC), Training Areas, Fort Stewart, Multi-County, Georgia. Field Supervisor. Phase I survey of 13,000 acres. Supervised daily fieldwork, recorded site data with Trimble GPS, performed site photography, and contributed to the technical report.

U.S. Army Corps of Engineers (USACE) Wilmington District, Marine Corps Base Camp Lejeune, North Carolina. Field Archaeologist. Phase II archaeological evaluation of five prehistoric archaeological sites.

D Key Team Members Project Experience Data Sheets

The Louis Berger Team's completed Key Team Members Project Experience Data Sheets are attached below and on the following pages.

KEY TEAM MEMBER PROJECT EXPERIENCE DATA SHEET

NAME Lauren Hayden, RPA, ENV SP

TITLE Project Manager

FIRM Louis Berger

PROJECT TITLE LOCATION AND TOTAL CONSTRUCTION COST OR FEE	A/E OF RECORD FOR THIS REFERENCED PROJECT	SPECIFIC TYPE OF WORK EXPERIENCE (STUDY, SCHEMATIC, CONSTRUCTION ADMINISTRATION)	TEAM MEMBERS SPECIFIC ROLE OR TITLE ON THE REFERENCED PROJECT	DURATION OF TEAM MEMBER'S INVOLVEMENT OF THE REFERENCED PROJECT (IN MONTHS)	% OF TIME DURING DURATION BASED UPON A 40 HOUR WEEK	DATES OF THE TEAM MEMBER'S INVOLVEMENT IN THE REFERENCED PROJECT	CLIENT NAME CONTRACT PERSON AND PHONE NUMBER
Higbee Beach Restoration Project, Cape May County, NJ. Cultural Resources Component: $53,621.10	Louis Berger	Phase I Archaeological Survey	Archaeologist	3	50%	03/2018-05/2018	NJDEP (ONRR), [redacted]
Mad Horse Creek Wetlands Restoration Project, Salem County, NJ. Cultural Resources Component: $228,425.33	Louis Berger	Phase I - II Archaeological Survey	Archaeologist	45	10%	12/2014-present, 8/2018	NJDEP (ONRR) [redacted]
Garden State Parkway Interchanges 9, 10, 11 Improvements, NJ. Cultural Resources Component: $767,940.46	Louis Berger	Phases I-III Archaeological Surveys	Archaeologist	127	2%	02/2008-present, 8/2018	NJTA [redacted]
Green Creek Tidal Estuary Sustainability Project, Cape May County, NJ Cultural Resources Component: $11,054.69	Louis Berger	Phase IA Archaeological Survey	Archaeologist	4	25%	12/2015-03/2016	County of Cape May [redacted]
Gorge Creek Site 1 Project, Schoharie, NJ. $92,267.65	Louis Berger	Phase III Archaeological Survey	Project Manager	7	5%	03/2017-09/2017	NY State GOSR [redacted]
Lewis-Higbee/Ontario 69kV Transmission Line Rebuild, Atlantic County, NJ Phase IB. Archaeology Fee: $46,352.42	Louis Berger	Phase I Archaeological Survey	Archaeologist	33	5%	11/2014-07/2017	Atlantic City Electric [redacted]
Susquehanna to Roseland 500kV Transmission Project, NJ and PA. Cultural Resources Component: $1,752,322.22	Louis Berger	Phase I/II Archaeological Survey	Archaeologist	34	5%	10/2008-07/2011	PPL [redacted]

KEY TEAM MEMBER PROJECT EXPERIENCE DATA SHEET

NAME Stuart Fiedel, PhD

TITLE Archaeologist/Principal Investigator

FIRM Louis Berger

PROJECT TITLE LOCATION AND TOTAL CONSTRUCTION COST OR FEE	A/E OF RECORD FOR THIS REFERENCED PROJECT	SPECIFIC TYPE OF WORK EXPERIENCE (STUDY, SCHEMATIC, CONSTRUCTION ADMINISTRATION)	TEAM MEMBERS SPECIFIC ROLE OR TITLE ON THE REFERENCED PROJECT	DURATION OF TEAM MEMBER'S INVOLVEMENT OF THE REFERENCED PROJECT (IN MONTHS)	% OF TIME DURING DURATION BASED UPON A 40 HOUR WEEK	DATES OF THE TEAM MEMBER'S INVOLVEMENT IN THE REFERENCED PROJECT	CLIENT NAME CONTRACT PERSON AND PHONE NUMBER
Garden State Parkway Interchanges 9, 10, 11 Improvements, NJ. Cultural Resources Component: $767,940.46	Louis Berger	Phase III Archaeological Data Recovery	Co-Author of Report	51	10%	10/2013-1/2018	NJTA [redacted]
Chesapeake & Ohio Canal National Historical Park Archaeological Identification and Evaluation Study, Maryland. $400,000	Louis Berger	Phase I/II Archaeological Surveys	Co-Principal Investigator	29	30%	3/2003-8/2005	NPS [redacted]
Gorge Creek Site 1 Project, Schoharie, NJ. $92,267.65	Louis Berger	Phase III Archaeological Data Recovery	Principal Investigator	7	40%	3/2017-9/2017	NY State GOSR [redacted]
Stones Creek and Bear Garden Game Lands Archaeological Study, Onslow County, NC. $298,049.94	Cogstone Resource Management	Phase I Archaeological Survey	Ceramic Analyst	4	5%	1/2018-4/2018	Cogstone Resource Management [redacted]
Riverfront Business Park , Archaeological Survey, Freetown, MA. $104,370	Louis Berger	Phase I Archaeological Survey	Principal Investigator	15	30%	5/2016-8/2017	Churchill and Banks [redacted]
Chopawamsic Creek Cultural Resource Investigations, Prince William County, VA.	Louis Berger	Phase I/II Archaeological Survey	Co-Principal Investigator	9	40%	10/2002-6/2003	NAVFAC Washington [redacted]

KEY TEAM MEMBER PROJECT EXPERIENCE DATA SHEET

NAME Justin Baker, PWS, CE, CERP

TITLE Wetland Scientist

FIRM Louis Berger

PROJECT TITLE LOCATION AND TOTAL CONSTRUCTION COST OR FEE	A/E OF RECORD FOR THIS REFERENCED PROJECT	SPECIFIC TYPE OF WORK EXPERIENCE (STUDY, SCHEMATIC, CONSTRUCTION ADMINISTRATION)	TEAM MEMBERS SPECIFIC ROLE OR TITLE ON THE REFERENCED PROJECT	DURATION OF TEAM MEMBER'S INVOLVEMENT OF THE REFERENCED PROJECT (IN MONTHS)	% OF TIME DURING DURATION BASED UPON A 40 HOUR WEEK	DATES OF THE TEAM MEMBER'S INVOLVEMENT IN THE REFERENCED PROJECT	CLIENT NAME CONTRACT PERSON AND PHONE NUMBER
Higbee Beach Restoration Project, Cape May County, NJ. $1,850,892	Louis Berger	Baseline Studies Conceptual Design Wetland Delineation Plant Community Surveys Permitting	Senior Scientist	59	15	9/2013 - present, 8/2018	NJDEP (ONRR) [redacted]
Mad Horse Creek Wetlands Restoration Project, Salem County, NJ. $735,058	Louis Berger	Wetland Delineation Wetland Restoration Design	Senior Scientist	20	20	1/2013 - present, 8/2018	NJDEP (ONRR) [redacted]
Garden State Parkway Interchanges 9, 10, 11 Improvements, Cape May County, NJ. $14,860,000	Louis Berger	Wetland Delineation Forest Impact Calculation	Senior Scientist	6	20	3/2012 - 4/2013	NJTA [redacted]
Herring River Restoration Project, Wellfleet, MA. $491,884	Louis Berger	EIS/EIR Wetland Delineation	Senior Scientist	5	15	5/2016 - 9/2017	Friends of Herring River [redacted]
Natural Resource Inventory and Assessment of Conservation Priorities of the Binnen Kill and its Tidal Habitats, Selkirk, NY. $98,000.	Louis Berger	Wetland Functional Assessment	Senior Scientist	10	10	10/2016 - 8/2017	NYSDEC [redacted]

KEY TEAM MEMBER PROJECT EXPERIENCE DATA SHEET

NAME Dan Wagner, PhD

TITLE Geomorphologist

FIRM Geo-Sci Consultants, LLC

PROJECT TITLE LOCATION AND TOTAL CONSTRUCTION COST OR FEE	A/E OF RECORD FOR THIS REFERENCED PROJECT	SPECIFIC TYPE OF WORK EXPERIENCE (STUDY, SCHEMATIC, CONSTRUCTION ADMINISTRATION)	TEAM MEMBERS SPECIFIC ROLE OR TITLE ON THE REFERENCED PROJECT	DURATION OF TEAM MEMBER'S INVOLVEMENT OF THE REFERENCED PROJECT (IN MONTHS)	% OF TIME DURING DURATION BASED UPON A 40 HOUR WEEK	DATES OF THE TEAM MEMBER'S INVOLVEMENT IN THE REFERENCED PROJECT	CLIENT NAME CONTRACT PERSON AND PHONE NUMBER
Geoarchaeology of Anacostia Park, Washington, DC. $26,300	Louis Berger	Characterization of landforms and degrees of disturbance	Geoarchaeologist	6	15%	5/15-10/15	Louis Berger [redacted]
Geoarchaeology of Poplar Point, Washington, DC. $4,800	Commonwealth Heritage Group, Inc.	Soil characterizations	Geoarchaeloogist	1	5%	4/15	Commonwealth Heritage Group, Inc. [redacted]
Geoarchaeology of Sugarhouse Casino, Philadelphia, PA. $3,900	A.D. Marble, Inc.	Assessment of shorelin disturbance	Geoarchaeologist	2	15%	3/14-4/14	A.D. Marble, Inc., [redacted]
Geoarchaeology of Glassboro-Camden Line, Gloucester County, NJ. $4,600	A.D. Marble, Inc.	Landform characterizations	Geoarchaeologist	2	15%	9/13-10/13	A.D. Marble, Inc. [redacted]
Geoarchaeology of Patuxent River Naval Air Station, St Mary's County, MD. $10,000	Louis Berger	Landform characterizations	Geoarchaeologist	5	10%	7/13-12/13	Louis Berger [redacted]
Geoarchaeology of Webster Field, St. Mary's County, MD. $4,800	Louis Berger	Landform characterizations	Geoarchaeologist	3	5%	6/12-8/12	Louis Berger [redacted]
Geoarchaeology of Edwin B. Forsyteh National Wildlife Refuge, Atlantic County, NJ. $2,500	Richard Grubb and Assoc., Inc.	Landform characterizations	Geoarchaeologist	1	5%	7/08-8/08	Richard Grubb and Assoc., Inc. [redacted]

KEY TEAM MEMBER PROJECT EXPERIENCE DATA SHEET

NAME Darrin Lowery, PhD

TITLE Coastal Geoarchaeologist

FIRM Geo-Sci Consultants, LLC

PROJECT TITLE LOCATION AND TOTAL CONSTRUCTION COST OR FEE	A/E OF RECORD FOR THIS REFERENCED PROJECT	SPECIFIC TYPE OF WORK EXPERIENCE (STUDY, SCHEMATIC, CONSTRUCTION ADMINISTRATION)	TEAM MEMBERS SPECIFIC ROLE OR TITLE ON THE REFERENCED PROJECT	DURATION OF TEAM MEMBER'S INVOLVEMENT OF THE REFERENCED PROJECT (IN MONTHS)	% OF TIME DURING DURATION BASED UPON A 40 HOUR WEEK	DATES OF THE TEAM MEMBER'S INVOLVEMENT IN THE REFERENCED PROJECT	CLIENT NAME CONTRACT PERSON AND PHONE NUMBER
Honga River Coastal Archaeological Survey, Dorchester County, MD. $60,100.00	Chesapeake Watershed Archaeological Research	Evaluate Coastal Erosion Impacts to Archaeological Sites	Principal Investigator	1	50%	3/2018-4/2018	Maryland Historical Trust [redacted]
Intertidal Archaeological Survey within the Coastal Zones of Accomack and Northampton Counties, VA. $178,703.00	Chesapeake Watershed Archaeological Research	Evaluate Coastal Erosion Impacts to Archaeological Sites	Principal Investigator	8	100%	2/2015-10/2016	Virginia Department of Historic Resources (DHR) [redacted]
Coastal Archaeological Survey of the Coastline within Back Bay, VA. $16,288.00	Chesapeake Watershed Archaeological Research	Phase I Coastal Archaeological Survey	Principal Investigator	3	25%	9/2013-12/2013	Virginia DHR [redacted]
Coastal Archaeological Survey of the Lower Coastal Section along the York River, VA. $8,712.00	Chesapeake Watershed Archaeological Research	Phase I Coastal Archaeological Survey	Principal Investigator	3	25%	9/2013-12/2013	Virginia DHR [redacted]
Geoarchaeological Testing at 44NH462 an Inundated Early Archaic to Late Archaic site, Coastal Northampton County, VA. $8,658.00	Chesapeake Watershed Archaeological Research	Phase II Coastal Geologic and Archaeological Testing	Principal Investigator	2	30%	4/2013-6/2013	Virginia DHR [redacted]
Geoarchaeological Investigation of late Holocene Sea Level Rise, Coastal Accomack County, VA. $7,348.00	Chesapeake Watershed Archaeological Research	Geoarchaeological Evaluation of Marine Transgression	Principal Investigator	1	30%	9/2012-10/2012	Virginia DHR [redacted]
Geoarchaeological Investigations of 44NH233 an Intertidal Clovis Occupation Site, Mockhorn Island, VA. $43,468.00	Chesapeake Watershed Archaeological Research	Phase II Coastal Geologic and Archaeological Testing	Principal Investigator	2	20%	8/2011-10/2011	Virginia DHR [redacted]

KEY TEAM MEMBER PROJECT EXPERIENCE DATA SHEET

NAME Delland Gould

TITLE Principal Field Director

FIRM Louis Berger

PROJECT TITLE LOCATION AND TOTAL CONSTRUCTION COST OR FEE	A/E OF RECORD FOR THIS REFERENCED PROJECT	SPECIFIC TYPE OF WORK EXPERIENCE (STUDY, SCHEMATIC, CONSTRUCTION ADMINISTRATION)	TEAM MEMBERS SPECIFIC ROLE OR TITLE ON THE REFERENCED PROJECT	DURATION OF TEAM MEMBER'S INVOLVEMENT OF THE REFERENCED PROJECT (IN MONTHS)	% OF TIME DURING DURATION BASED UPON A 40 HOUR WEEK	DATES OF THE TEAM MEMBER'S INVOLVEMENT IN THE REFERENCED PROJECT	CLIENT NAME CONTRACT PERSON AND PHONE NUMBER
Mad Horse Creek Wetlands Restoration Project, Salem County, NJ. Cultural Resources Component: $228,425.33	Louis Berger	Phase I - II Archaeological Survey	Principal Field Director	0.5	100%	Dec-14	NJDEP (ONRR) [redacted]
Northeast Energy Direct Express (NED) Pipeline Project, NH, NY, MA. $3,842,947.42	Hatch Mott MacDonald	Phase I Archaeological Survey	Principal Field Director	5	80%	August/2014-February/2016	Tennessee Gas/Kinder Morgan [redacted]
Stones Creek and Bear Garden Game Lands Archaeological Study, Onslow County, NC. $298,049.94	Cogstone Resource Management	Phase I Archaeological Survey	Principal Field Director	0.25	100%	Mar-18	Cogstone Resource Management [redacted]
Chesapeake & Ohio Canal National Historical Park Archaeological Identification and Evaluation Study, Maryland. $400,000	Louis Berger	Phase I/II Archaeological Surveys	Principal Field Director	0.75	100%	May-10	NPS Stephen Potter (retired) [redacted]
Phase I Geoarcheology Survey Effigy Mounds National Monument, Harpers Ferry, IA. $42,574.40	Louis Berger	Phase I Archaeological and Geoarchaeological Survey	Project Manager; Principal Field Director	2	45%	Feb-Mar/2018	National Park Service, Midwest Region [redacted]

KEY TEAM MEMBER PROJECT EXPERIENCE DATA SHEET

NAME Tracey Jones

TITLE Senior Field Supervisor

FIRM Louis Berger

PROJECT TITLE LOCATION AND TOTAL CONSTRUCTION COST OR FEE	A/E OF RECORD FOR THIS REFERENCED PROJECT	SPECIFIC TYPE OF WORK EXPERIENCE (STUDY, SCHEMATIC, CONSTRUCTION ADMINISTRATION)	TEAM MEMBERS SPECIFIC ROLE OR TITLE ON THE REFERENCED PROJECT	DURATION OF TEAM MEMBER'S INVOLVEMENT OF THE REFERENCED PROJECT (IN MONTHS)	% OF TIME DURING DURATION BASED UPON A 40 HOUR WEEK	DATES OF THE TEAM MEMBER'S INVOLVEMENT IN THE REFERENCED PROJECT	CLIENT NAME CONTRACT PERSON AND PHONE NUMBER
Mad Horse Creek Wetlands Restoration Project, Salem County, NJ. $735,058	Louis Berger	Phase I Archaeological Survey	Field Supervisor	0.5	100	Dec-14	NJDEP (ONRR) [redacted]
Northeast Energy Direct Express (NED) Pipeline Project, NH, NY, MA. $3,842,947.42	Hatch Mott MacDonald	Phase I Archaeological Survey	Field Supervisor	5	100	Apr-18	Tennessee Gas/Kinder Morgan [redacted]
Dauphin-Harrisburg Reliability Project, Sunbury-Dauphin 69kV Transmission Line, Dauphin County, PA. $13,692.92	Louis Berger	Field Investigation (Technical Report)	Field Supervisor	0.25	100	Apr-17	PPL Electric Utilities, Inc., [redacted]
Murry Crest-White Valley 138 kilovolt (kV) Transmission Line Tap to Sunoco Delmont, Westmoreland County, PA. $29,880.40	Louis Berger	Phase I Archaeological Survey	Field Supervisor	0.5	100	Jan-16	FirstEnergy, [redacted]
Naval Auxilary Landing Field, Fentress, Chesapeake, VA. $111,631.16	Leidos	Phase I Archaeological Survey	Field Supervisor	0.75	100	May-18	NAVFAC [redacted]
Joint Base Langley -Eustis, Fort Eustis, City of Newport News, VA. $339,119	Louis Berger	Phase II Archaeological Survey	Field Supervisor	1	100	November-December 2014	USACE Mobile District [redacted]
Training Areas, Fort Stewart, Multi-County, GA. 1,048,355.98	Louis Berger	Phase I Archaeological Survey	Field Supervisor	3	100	February-April 2011	USAEC [redacted]

E Project Key Personnel Form

The Louis Berger Team's completed Key Personnel Form is attached below.

FIRM NAME	KEY PERSONNEL & TITLE	PHASE I - ARCHAEOLOGICAL CONTEXT BACKGROUND RESEARCH AND RESEARCH DESIGN	PHASE II - FIELD INVESTIGATION AND SURVEY PHASE	PHASE II - ANALYSIS & REPORTING PHASE	PHASE IV - PROJECT CLOSE-OUT PHASE	HOURLY WAGE LEVEL 1-7
Louis Berger	Lauren Hayden, RPA, ENV SP	68	144	64	8	3
Louis Berger	Stuart Fiedel, PhD	164	64	176	0	5
Louis Berger	Justin Baker, PWS, CE, CERP	0	248	0	0	6
Geo-Sci Consultants	Dan Wagner, PhD	24	64	80	0	7
Geo-Sci Consultants	Darrin Lowery, PhD	24	72	80	0	7
Louis Berger	Delland Gould	32	96	64	0	3
Louis Berger	Tracey Jones	0	288	0	0	2

INSERT THE WAGE LEVEL FROM 1 TO 7 OF EACH KEY PERSON. **DO NOT INSERT ANY HOURLY RATE**

F Project Approach

Louis Berger understands the project tasks to consist of three major phases: I. Background Research and Development of a Research Design; II. Field Investigation and Survey; and III. Analysis and Reporting. These components are described in detail below.

Phase I - Background Research and Development of a Research Design

Background research will include the following:

1. A comprehensive literature review of both local and regional prehistory and history, with a focus on occupation and exploitation of coastal environments. Louis Berger staff have already amassed and synthesized this literature for the recently completed report of data recovery excavations along the Garden State Parkway near Cape May Courthouse (Davis et al. 2017).

2. Documentary archival research at both local and regional repositories including local libraries and historical societies, county cultural and heritage commissions, the New Jersey State Library, and the New Jersey State Archives. In addition, Louis Berger will consult historic maps, aerial photographs, secondary sources, and agency files located at both the NJHPO and New Jersey State Museum.

3. Research using historic maps, deeds, and chains of title to tracing land use through time in the project area.

4. Personal interviews conducted with knowledgeable individuals (avocational collectors, land managers, residents, other professionals). In particular, the New Jersey Division of Fish and Wildlife land manager of Higbee Beach WMA has information on past projects and improvements undertaken in the area.

5. Research on existing archaeological testing methodologies for tidal estuary, coastal plain, and shoreline environments on the Atlantic coast.

6. A synthesis of current research on climatology and paleoenvironmental reconstruction in coastal areas in general, and in New Jersey specifically. Again, Louis Berger has previously synthesized the literature on late Pleistocene and Holocene climate and environments for the Cape May data recovery (Davis et al. 2017) and also for several recent projects focused on the Mid-Atlantic coastal plain.

7. A site visit and comprehensive photo-documentation of the entire project area. This reconnaissance will identify potential archaeological surface features, document present land-use, and also document current surface visibility, topography, and geomorphology of the project area.

8. Identification and prioritization of archaeologically sensitive areas and testable landforms within the project area. The ranking of relative sensitivity (basically, high, moderate, low, and none) will be based on criteria derived from an explicit region-specific model.

9. Development of research questions and objectives to be addressed by the next phase of geomorphological and archaeological testing.

10. Determination or prediction of the approximate depths of significant archaeological or paleoenvironmental deposits below the ground surface. Specifically, Louis Berger will consider the potential for deep loess deposits and for submerged former uplands. Louis Berger's geoarchaeology consultants, Dan Wagner and Darrin Lowery, have pioneered the recognition of Younger Dryas-aged loess deposits in the circum-Chesapeake region and in the Delaware drainage, and Lowery has been exploring the use of drowned upland sites and tidal marshes to track the chronology of sea level rise in the Mid-Atlantic region.

11. Based on the results of background research, the Principal Investigator and Geomorphologist will develop a research design and work plan for geomorphological investigation and Phase I archaeological survey at Higbee Beach WMA.

A central goal of collecting locality-specific geomorphological data at Higbee Beach will be to clarify the nature and chronology of local sea level rise and the transition from former uplands to wetlands. These processes certainly caused changes in local human adaptations and settlement patterns. Three periods are of particular interest.

1. A minor meltwater pulse (MWP 1C), dated to ca. 8200 to 7600 cal BP, seems to have been associated with final draining of the giant periglacial Lake Agassiz into the North Atlantic and the synchronous 8200 cal BP cold event; sea level rose by about 1 meter (Tornqvist and Hijma 2012). The rate of sea level rise then slowed around 7500 cal BP. MWP 1C seems to have resulted in a sudden influx of seawater into Chesapeake Bay and the first appearance of oysters there about 8000 cal BP (Bratton et al. 2003). Was there a similar event in Delaware Bay?

2. Psuty (1986) inferred a dramatic slow-down of the rate of sea level rise on the New Jersey coast from 2 to 0.5 millimeters per year around 2500 to 2000 cal BP. According to Ferland (1990:63), on the Atlantic coast near Cape May "A marked decrease in the rate of sea-level rise indicated at approximately 2,000 years B.P. allowed marshes to become established and this promoted infilling of the system." John and Pizzuto (1995) found evidence in three sediment sequences that tidal wetlands (represented by peats) had expanded as the sea level in the Delaware Bay possibly fell (regressed) at circa 2300 cal BP; then the wetlands were covered by mud as the sea level rose again (a "dramatic transgression") at 2000 cal BP. The tidal wetlands expanded again around 900 cal BP. Correcting for isostatic rebound effect, Kemp et al. (2013) find that sea level off New Jersey fell slightly between 2500 and 1750 cal BP (at a rate of 0.11 millimeter per year) and between cal AD 733 and 1850 (at a rate of 0.12 millimeter per year). Between about cal AD 250 and 730, the rate of sea level rise accelerated to +0.62 millimeter per year and relative sea level rose by about 25 centimeters. The regressions of the bay hypothesized by John and Pizzuto appear to roughly correspond to the periods of slight sea-level fall calculated by Kemp et al. (2013) (2500 to 1750 cal BP and cal AD 733 to 1850). Can these fluctuations be substantiated by evidence from the WMA wetlands? If they happened, how did they affect the adaptations of the Middle Woodland population, or the persistence of their archaeological traces?

3. At Kimble's Beach, about 10 miles north of the project area, a Late Woodland occupation dated between ca. cal AD 1300 and 1500 is now buried beneath beach sand and tidal marsh peat. The stratigraphy here suggests that the bay has risen about 1.5 meters or more since AD 1500. It is estimated that the shoreline here receded by about 79 meters between 1940 and 1995, at mean annual transgression rate of 1.45 meters per year (Cavallo et al. 1996; Kotcho 2009; Bierbrauer 2014; Bierbrauer et al. 2014; Hartwick et al. 2016). Local historians report that the first Anglo-American settlement on the Cape May peninsula was a New England whalers' community established around 1690 at Town Bank (also known as Portsmouth or New England Village). This site was on the coast just north of the former New England Creek, which has been expanded to form part of the Intracoastal Waterway. The town is not shown in detail on any period maps, but it is depicted on a nineteenth-century copy of an original map (Richards 1954). Already by the 1770s, the location is no longer named. Local historians believe it was destroyed when the waters of the bay undercut the bluff. If so, this must have happened in the early eighteenth century. No remaining houses of Town Bank are depicted on the 1857 map (NJSGS 1857). What was the rate of sea level rise during the ca. 300 years between the occupations of Kimble's Beach and Town Bank? Kemp et al. (2013) estimate that sea level off New Jersey has been rising at a rate of 3.1 millimeters per year since 1850-- a rate unprecedented in the last 2,500 years. But did this marked acceleration actually begin a century or more earlier, as the disappearance of Town Bank might indicate? The State Geologist, H. D. Rogers, estimated in 1840 that the shoreline of the bay was eroding at a rate of half a rod (2.5 meters) per year (Rogers 1840).

Phase II - Field Investigation and Survey

The RFP envisions a research design and field strategy that would appear to be at cross-purposes in some respects. One goal is to broadly sample all of the portions of the project area (within 13 pre-defined "blocks") that are deemed to be high-probability zones. It is presumed that this testing will identify some number of previously undiscovered archaeological sites. For this purpose, a testing interval of no more than 50 feet (15 meters) is mandated, a large number (ca. 2400) of shovel tests are required, and it is assumed that about 20-to 40-percent of the high-probability zones will be tested. On the other hand, the survey is to be used to test the relative efficacy of different testing procedures (e.g., round vs. square shovel tests, narrower or wider-interval tests, shovel tests vs. larger units) in identifying and characterizing sites. But if there actually are no sites present, all of these methods will be indistinguishably unproductive. For this methodological exercise, it is necessary to first ascertain that archaeological deposits are present; following that, diverse methods can be compared to see if they would miss the site altogether, or under-estimate its size or density. Louis Berger therefore tentatively proposes (subject to change if counter-indicated by the results of background research) to initially conduct tight-interval (5 or 10-meter) shovel testing in judgmentally determined high-probability patches on at least one sample of each of the landform types of presumed high archaeological sensitivity (i.e., Wetland High Spots, Stream Edge Terraces, Periglacial "Spungs" (former ovoid water basins), Coastal Dunes/Terraces, and Areas of Historic Occupation).

The RFP envisions testing of a zone called "Former Uplands" which "include drowned fluvial floodplain/terrace landforms now below wetlands and beach faces." However, because it is assumed that fieldwork will occur in winter, the RFP also states, "no work will be conducted in wetland areas," which constitute about 55% of the 1,083 acres of the WMA. Louis Berger will work with the geomorphologist to identify potential locations within the project area where no surficial wetlands are currently extant (i.e, former buried wetlands).

Where the initial testing identifies a site, the apparent center (based on artifact density and topography) will be used as a node to align a series of two or more transects. At a minimum, one transect will consist of ca. one foot (30 cm)-diameter circular shovel tests, and a perpendicular transect will consist of 50 cm (1.6-ft)-square shovel tests. Where more than one circular test (with an area of 706 cm^2) produces 7 or more prehistoric artifacts, or more than one square test (with an area of 2500 cm^2) produces 25 or more artifacts, a 1-x-1-meter unit will be excavated nearly adjacent to the most productive shovel test (these threshold numbers may be adjusted upward when applied to historic or multicomponent sites). It is reasonable to predict recovery of ca. 100 artifacts or more from a 1-x-1-meter unit in these locations.

Geomorphological testing will consist of a number of testing strategies including different types of cores and test units. It will be particularly interesting if any "spungs" are present that are not otherwise classified as protected habitats/ environmental features (i.e., currently dry or infilled) as the origin and chronology of these features remain controversial (e.g., French and Demitroff 2001), and their sediments may contain good pollen records of regional vegetation throughout the Holocene.

Louis Berger will assure compliance with the New Jersey "One Call" Program prior to field investigations. Louis Berger's investigations will adhere to these guidelines as itemized in the RFP.

1. Geomorphological and archaeological survey efforts will comply with the New Jersey Historic Preservation Office rules for Phase I Archaeological Survey at N.J.A.C. 7:4-8.4.

2. All archaeological investigations will be carried out by, or under the direct supervision of, a field director who exceeds the Secretary of the Interior's Professional Qualifications Standards for Archaeology, with more than five years of experience in pre-contact archaeology.

3. All geomorphological investigations will be carried out by a project Geomorphologist with more than 10 years of demonstrated professional expertise in field geomorphology.

4. Within the project area there are several threatened and endangered plant species that must be protected throughout all phases of survey. Louis Berger has staff biologists and wetland scientists familiar with this area who will monitor all investigations to ensure avoidance of impacts to threatened and endangered plants during the survey.

5. The strategies for geomorphological and archaeological field investigations will be driven by the specific questions generated during the research stage.

6. Louis Berger will develop and implement a schedule for the field investigations.

7. The testing strategies will be flexibly designed to most effectively sample each of the varied topographic zones/ features in the project area, and to address the pertinent research questions. Any deviations, suggestions, or additions to the planned testing strategy will be developed in consultation with the NJHPO. Such changes will be clearly identified and fully explained.

8. All areas recommended for testing will be delineated on project maps.

9. Excavations will comply with Occupational Safety & Health Administration (OSHA) standards. Testing will not be conducted in locations deemed unsafe. Louis Berger has a stringent safety policy and always implements a project-specific health and safety plan.

10. A permanent universal reference grid will be established to be used for recordation of shovel tests, units, artifacts and features on maps and in a Geographic Information System (GIS). Permanent benchmarks will be established and documented so that horizontal and vertical control can be reestablished in the future.

11. Mapping and recording of spatial and GIS data will follow NJDEP Mapping and Digital Data Standards (http://www.state.nj.us/dep/gis/standard.htm).

12. Louis Berger will excavate shovel tests at intervals developed in the research design but not exceeding 15 meters (50 feet).

13. As described above, in particular locations, transects of circular shovel tests will be alternated with transects of square shovel tests as a methodological test.

14. Discretionary 1-meter (3.3-ft) test units will be excavated to complement the shovel tests, as described above.

15. These test units will be excavated where high artifact densities or features (e.g., fire-cracked rock concentrations or shell layers) are identified by shovel testing.

16. All shovel tests and test units will be excavated according to visible stratigraphic horizons unless artifacts and/or features are encountered. At that point, soil will be removed in 10-cm arbitrary levels into subsoil or archaeologically sterile or Pleistocene-age sediments.

17. The geomorphological methodology will include the following. Each of the designated landforms will be traversed and associated soils characterized in detail. This will typically entail examinations via transects across the landforms, with most soil examinations by means of hand auger borings. Some coordination with archaeological excavations may also allow recording of soil exposures in shovel tests. If soft organic materials are encountered in poorly drained subsurface settings such as buried tidal marsh or spung deposits, a specialized peat sampler may be necessary. The actual number and placement of soil observations will be based on field discretion, but in all instances sufficient observations will be made to generate thorough characterizations.

    In addition to landform and soil characterizations, evaluation of the effects of coastal processes is also an important focus of the study. The evolution of coastal settings is complicated. This is especially true when trying to understand or evaluate associated archaeological resources. The long-term and short-term interplay between marine transgression and coastal erosion has hindered our understanding of prehistoric human use of coastal areas and marine/estuarine resources. Marine transgression, which occurs on a centennial and millennial time-scale, has inundated an untold quantity of archaeological sites beneath saline water or encapsulated these sites beneath varying thicknesses of tidal marsh peat. In tandem with sea level rise, coastal erosion, which occurs on an hourly and daily time-scale, can essentially erase or rework the tangible remains once associated with many nearshore terrestrial archaeological sites. However, despite these destructive forces, it is possible to assess the short-term and long-term environmental changes at extant or surviving archaeological sites. Listed below are a number of available methodologies that may be employed for this purpose, while also enhancing the overall geomorphological assessment of the project area.

    Pedestrian examinations will be made of all exposed shorelines at maximum low tide to determine the status of archaeological sites within the swash and berm zone, as well as to assess erosion and accretion along tidal streams and coastal shorelines.

    Digital elevation models (DEM) and/or field-generated low altitude airborne LIDAR imaging can provide a baseline understanding of the present topographic relief and also facilitate detection of both natural and anthropogenic features.

    Georeferenced early-and mid-20th-century aerials provide views of the upland/tidal marsh interface and thus generate information about recent marine transgression and/or anthropogenic alterations to drainages within tidal marshes. Georeferenced historic mid- and late-19th-Century coastal T-chart surveys provide data for detailed assessment of land use modifications over the past 150 to 170 years.

    Field-based georeferenced linear shoreline soil-sediment profiles can help assess the former extent of the upland as indicated by drowned upland surfaces beneath tidal marsh peat. With respect to the evolution of coastal landscapes, tidal marsh thickness is expressive of the degree of sea level change over time. Radiocarbon dating of various drowned former upland archaeological features, inundated former upland plant macro-remains (e.g., tree stumps), as well as basal tidal marsh peat, can provide data needed to evaluate the local applicability of modeled regional rates of Holocene marine transgression and to track the development through time of local coastal ecosystems.

    Hand-augering or piston-coring along the margins of the upland/tidal marsh interface can also help assess former topographic relief and fluctuations in the amount of upland during the Holocene. These cores can also delineate former low sea stand paleo-valleys or ravines. Analysis of macro- and micro-floral and faunal materials that have accumulated within the paleo-ravines and/or paleo-valleys can provide a more detailed understanding of regional vegetation changes and the timing of salt-water intrusion into these valleys during the Holocene.

18. All excavated soils will be screened through 1/4-inch-mesh hardware cloth. Representative profiles, including Munsell color and texture descriptions and photographs (for units only), will be provided for each shovel test and test unit. Louis Berger uses standardized forms for this purpose.

19. All recovered artifacts will be field-logged and bagged according to individual stratigraphic context/discrete provenience. The field notes will include scaled sketches of any diagnostic artifacts.

20. Radiocarbon samples recovered from archaeological or paleoenvironmental contexts will be quickly isolated from surrounding contaminants, carefully wrapped in aluminum foil, and double bagged. A tag identifying locational information and sample number will be placed in the outer bag for subsequent testing. Similar collection methods may be implemented for other specialized samples identified in the research design.

21. In Louis Berger's archaeological laboratory, technicians will clean, identify, analyze, catalogue, and label artifacts according to their respective provenience, in accordance with the Secretary of the Interior's Standards for Curation. The artifacts will be classified according to chronology, cultural affiliation, technological attributes, and inferred function.

22. NJDEP will be designated as the owner of the artifact collection. After project completion, the artifacts and field/lab/administrative records will be transmitted to a repository chosen by NJDEP.

23. Scale plan and profile drawings will be produced for test units, features, and shovel testing areas. An overall site plan will be produced, showing the locations of geomorphological and archaeological testing and photographs.

24. Louis Berger will take digital photographs, with in-picture scales, to document overall site topography, significant elements of the cultural landscapes, and each test unit including stratigraphy and any features identified within it.

25. If intact pre-contact features (e.g., storage pits or hearths) are encountered, samples will be taken from the feature matrix for flotation.

26. In the event that a shell midden is encountered, judgmental shovel tests, and possibly also a test unit, will be excavated within it to determine whether it is stratified and to attempt to recover diagnostic potsherds or lithic artifacts. Shells will be weighed, and a representative sample will be collected for radiocarbon assays. Bones of other species, particularly fish and turtles, may also be present. Midden samples will be examined visually, and possibly also by flotation, to retrieve such remains, and they will be identified and characterized by a zooarchaeological analyst.

    If well-defined shell piles or shell-filled pits are identified, they may provide an opportunity to investigate local marine reservoir effects. Previous attempts to date sites in the New Jersey coastal plain using shell samples have produced results of varying credibility. As is well known, shellfish absorb "old" carbon (long sequestered from its atmospheric source) from the surrounding marine waters. At the global scale, marine organisms in the Atlantic yield ages that are approximately 400 to 500 years older than contemporary terrestrial organisms (Stuiver et al. 1986; Reimer et al. 2013). This average difference has varied somewhat over time. Also, the surface waters of a particular region may differ significantly from this average, given regional differences in upwelling of deep waters to the surface. This difference is expressed by an additional correction factor, denoted as ΔR (regional marine ^{14}C reservoir effect), which is defined as the difference between the reservoir age of the mixed layer of the local ocean and the reservoir age of the mixed layer of the average world ocean in AD 1950 (Stuiver et al. 1986). The precise value of ΔR for marine organisms off the New Jersey coast has not been determined. Perhaps the most applicable value is 106±46 years, obtained for an oyster collected alive in 1945 in Sinepuxant Bay near Ocean City, Maryland (Rick et al. 2012). This oyster yielded a radiocarbon age of 570±40 rcybp; according to the global model, it should be dated to 464±23 rcybp. This value would reflect mainly marine water, rather than the additional freshwater inputs that affect the carbon reservoir in the region's estuaries. Rick and Lowery (2013) dated shell particles used to temper pottery from Woodland sites in Delmarva. Based on comparison with charcoal, nutshell, and bone samples from the same contexts, they found that, using the appropriate reservoir corrections, the shell dates were comparably accurate. Curiously, a review of radiocarbon dates in Delaware (Ramsey and Baxter 1996) found that shell dates (on shellfish from submerged locations in Delaware Bay) were generally younger than expected, particularly for the period 4000-2000 rcybp. Some unidentified contaminant was suspected, but perhaps a major change in the local reservoir effect may be indicated.

An additional complication is the possibility of substantial inter-annual and even intra-annual seasonal variability in radiocarbon uptake during the short life of any individual shellfish. Culleton et al. (2006) reported variations of 120 to 240 ^{14}C years in short growth increments sampled from individual Mytilus shells in coastal southern California. Grimm et al. (2017) report a mean ΔR value of -32±11 ^{14}C years for 17th-century oysters from the James River estuary. However, the range of the entire 23-sample set is 260 ^{14}C years, from -151±46 to +109±55 ^{14}C years; and the ΔR of the summer-growth and fall/spring-growth sections of individual shells differs by as much as 195 ^{14}C years.

27. The first step in analysis of the lithic artifacts will be to sort them into tool and debitage classes. Following this, they will be sorted and analyzed with respect to functional morphology, technological reduction stages, metrical and other attributes (e.g. lithic material, color, texture and inferred source of the stone).

    Projectile points will be assigned to recognized regional types. This classification is crucial for establishing the chronology of each site as a whole, and possibly for distinguishing sectors occupied by distinct social groups, whether sequentially or simultaneously. Breakage patterns, edge and tip wear, and re-working will be noted. Other formed tools will be classified as end or side-scrapers, knives, drills, or other functional classes based on a combination of morphology and any observed use-wear or breakage.

    For bifaces, presence/absence of cortical surfaces and width-to-thickness ratios will be examined as indicators of the stage of reduction. For cores, size, shape, extent of cortex, and flaking patterns will recorded.

    Lithic debitage, including all types of flakes created in the lithic reduction sequence, will be counted and measured. Raw material type, lithic reduction stage (blocky shatter, decortication, early, biface reduction, thinning) and presence/absence of cortex also will be recorded. Whole and broken flakes (lacking the original striking platform or termination) will be distinguished.

    All debitage will be visually inspected for patterned edge damage and/or retouching. A sample of those artifacts with ostensible edge alteration will be examined using low-power microscopy, to identify micro-flake scars, snap fractures, step fractures, and edge rounding.

    Following analyses of the lithic artifacts, a spatial analysis will be performed, focusing on horizontal variation in the distributions of lithic materials, tool types and debitage classes.

28. Additional specialized testing and analyses (e.g., pollen analysis) may be conducted at the discretion of the Principal Investigator and NJHPO PM.

29. If human skeletal remains are encountered, all ground-disturbing activities in the vicinity will cease immediately and the NJHPO and any appropriate legal officials will be contacted. The remains will be left in place unless imminently threatened (e.g., by wave action).

Phase III - Analysis and Reporting

All data collected during background research and field investigations will be analyzed and presented in a draft multidisciplinary technical report, which Louis Berger will submit for review and approval. The draft technical report will meet the NJHPO's requirements for archaeological survey reports, the standards for report sufficiency at N.J.A.C. 7:4-8:5, and the standards and guidelines set forth by the Secretary of the Interior's Standards for Archaeology and Historic Preservation. The draft report will include:

1. The final version of background research results.

2. A detailed interpretive analysis of the results of geomorphological testing, which will address issues of site depositional processes and their effects on archaeological preservation, visibility of archaeological sites, and the evolution of landforms.

3. A comparative analysis of the results of Phase I archaeological testing methodologies with recommendations for future applications in coastal settings in New Jersey.

4. Refinement of current models of long-term landscape evolution in the region.

5. A regional sensitivity model for the occurrence of pre-contact and historic period archaeological resources based on coastal landform(s)/setting(s) along the Delaware Bay shore. This model, incorporating GIS data, will identify areas of high, moderate, and low archaeological sensitivity while also noting areas in danger of erosion and development. The relative sensitivity rankings, based on explicit criteria, will reflect the results of background research, geomorphological and archaeological investigations, and region-specific models.

6. Based on the results of background research and field testing, a synthesis of the past cultural occupation(s) of the Higbee Beach WMA will be presented. This synthesis will also use the data generated by this study to address broader issues (e.g., chronology, adaptation, subsistence and settlement patterns) pertaining to the pre-contact and historic period occupation/exploitation of Delaware Bay and Atlantic Coastal near-shore environments of New Jersey.

7. National Register eligibility recommendations. Louis Berger will offer preliminary recommendations concerning the National Register eligibility of archaeological resources identified in the field survey. With regard to Criterion D, the usual consideration for archaeological sites, the crucial questions are whether these sites 1) retain spatial and integrity and 2) may contain information important for the study of history or prehistory. We caution that the data generated at the proposed level of investigation may be sufficient to document loss of integrity (owing to erosion or agricultural or industrial disturbance) in some cases, but may be inadequate to accurately characterize the information content and significance of sites that appear to have retained integrity.

8. Completed site forms for each archaeological site within the WMA registered with the New Jersey State Museum.

9. Final artifact and site collections repository information.

10. The results of any paleobotanical or zooarchaeological studies and radiocarbon assays.

11. The results of lithic analyses.

12. The results and findings of any additional specialized testing and analyses.

13. Recommendations for the treatment of archaeological resources prior to future shoreline engineering and development efforts.

14. Suggestions for future archaeological research in coastal New Jersey.

Geographic Information System (GIS) Data

Supporting, analytical, and GIS data developed during report preparation will be submitted to the NJHPO in digital format on CD along with the draft and final reports. All recordation and mapping of data will comply with NJDEP Mapping and Digital Data Standards (http://www.state.nj.us/dep/gis/standard.htm). The data will include:

1. Mapping of all archaeological sites identified during fieldwork in GIS; site boundaries will be delineated as polygons in GIS. NJHPO will provide details of the existing attribute table for site recordation and mapping in GIS.

2. Locational GIS data keyed to the artifact catalog.

3. A GIS sensitivity model for the Delaware Bay shore.

Project Close-Out Phase

Once all deliverables are completed, Louis Berger will execute close out activities including final invoice and close out forms for final payment within 246 calendar days of project initiation.

Meetings and Presentations

1. Louis Berger will attend a kickoff meeting with the DPMC Project Manager at the commencement of the project.

2. Louis Berger will also conduct the appropriate number of review meetings with the Project Team members during each phase of the project to make sure the project remains on track and within expectations.

3. Louis Berger will record the minutes of each meeting and distribute within seven calendar days to all attendees and persons specified to be on the distribution list by the Project Manager

4. Louis Berger will conduct three oral presentations at the completion of the three major phases of work a) Background Research and Development of a Research Design; b) Field Investigations; c) Reporting Results.

Project QA/QC

Louis Berger has a corporate-wide quality assurance/quality control (QA/QC) system that is designed to ensure that all projects meet rigorous internal and external standards from inception to completion. Louis Berger's process requires that all client submissions meet the stated requirements of the contract, are consistent with the standard of care for the environmental consulting industry, and are able to satisfy the applicable codes, regulatory requirements and industry standard practices. The QA/QC process also requires that documentation be prepared and filed, subject to an audit that demonstrates that QA/QC has been performed. The proper implementation of QA/QC standards will maintain quality control of all elements of each project undertaken during the contract, including field sampling, laboratory analysis, documentation, evaluation, and recommendations. The QA/QC plan will require documentation by team members that all completed tasks and client submission have been subjected to and passed the QA/QC standards. The program is designed to identify deviations from planned schedules, allow corrective actions, and, by internal reviews, to maintain defensible conclusions and high standards of quality. With a rigorous QA/QC program in place, the contract team assembled by Louis Berger can more effectively and efficiently meet project schedules, provide services of high professional standards, perform all work within budget, and communicate project status to the DPMC and NJDEP.

Facilities and Equipment

Combined field equipment from all Louis Berger offices is available to equip more than 100 field archaeologists at any one time. Louis Berger has centralized purchasing and maintains an inventory of all equipment and supplies required for fieldwork assignments. The Louis Berger team's capabilities include a specialized data management system suitable for inventorying and analyzing multivariate archaeological data, technical editing and production, cartographic expertise, geographic digital data collection and analyses, as needed in-house printing, and a fully equipped archaeological and historic preservation laboratory. Specific laboratory capabilities include comprehensive precontact and historic artifact analyses, conservation of materials from both wet and dry sites, faunal and other specialized analyses, and temporary curation facilities.

Now in its fourth decade of operation, Louis Berger's archaeology laboratory has processed and curated millions of artifacts. The laboratory maintains a professional staff, including a laboratory supervisor and technician support. Louis Berger archaeologists are available for additional specialized analyses, and the company maintains long-standing relationships with several consultants with expertise in floral analysis, faunal analysis, pollen analysis, phytolith analysis, skeletal analysis, and other specialties. The lab is equipped with the space and materials necessary to process and temporarily curate a wide range of archaeological materials, including both precontact and historic artifacts and other materials, such as soil and carbon samples. Laboratory personnel are familiar with the varied curatorial policies and procedures for every state, federal, and local entity on the client roster.

Louis Berger prepares hundreds of full-length technical heritage resource reports per year and maintains a full-service in-house production department, including professional editors and graphic artists. The extensive reference library of heritage resource management reports, periodicals, monographs, and other reference materials, in addition to maps and aerial photographs, allows the firm to achieve great efficiency in background and historic context development. In addition, all Louis Berger heritage resource reports are available in a digital database that is easily accessible to the heritage resource staff. Technical and research library and library file-search capabilities that include federal, state, and local heritage resource-related documents and regulations can be accessed on demand.

Digital Data and Cartographic Capabilities

Louis Berger has extensive experience in the preparation of measured drawings generated through field investigations, preparation of schematic floor plans for buildings in accordance with HABS/HAER specifications, and formatting and presentation of photographic plates. Louis Berger has the computing systems, software, and trained personnel to accomplish any database, Global Positioning System (GPS), and GIS tasks that may be required. Louis Berger has experience leveraging ESRI's desktop and online programs, including ArcGIS Pro, to meet a variety of project and client needs, and will work closely with DPMC staff to employ a database schema and data format that fits with DPMC's existing GIS system. Being an ESRI Business Partner Corporate Consultant and a Microsoft Developers Network member enables Louis Berger to stay at the forefront of leading GIS technology, information technology, and software development. Louis Berger is also currently deploying Windows 10 operating systems, Microsoft Azure, and enhanced cybersecurity protocols to ensure the most advanced data sharing, compatibility, and security measures for all its clients.

Louis Berger employs Trimble GeoXH™ (subfoot) and GeoXT™ (submeter) GPS units for field data collection efforts, and Trimble's TerraFlex and ESRI's Collector for ArcGIS provide two platforms for deploying custom mobile data collection forms. The locations and attribute information for all field collection efforts will be gathered at the requisite accuracy level using these GPS systems. High-quality mapping templates will be used in GIS to illustrate the precise location of excavation and terrain features, and any other field-collected data. Geographic information collected in the field can be used in GIS for localized analyses of changes in the built environment, for local or statewide mapping of archaeological resources and project areas, and for other types of analyses as required by the project.

Corporate Health and Safety Standards

Louis Berger has dedicated Health and Safety staff at the corporate level, as well as Health and Safety standards that must be followed during each project. Health and safety will be addressed in an OSHA-mandated site-specific health and safety plan (HASP). The HASP identifies and evaluates health and safety hazards that may exist in a project area and provides procedures and equipment to be employed to minimize worker exposure to the potential hazards. The HASP for each project can be amended in the field to address new safety hazards that might arise during fieldwork. In addition, Louis Berger's policies regarding health and safety require that all fieldwork efforts must implement a daily Job Safety Analysis (JSA), with an informal tailgate briefing conducted every morning prior to the start of work, and a second safety review briefing conducted at the end of each field day. The highlighted topic addressed at the daily JSA can be drawn from the project-specific HASP, or can be related to general health and safety issues, but every JSA session involves a brief review of project-specific hazards and safety concerns. Louis Berger has also implemented an internal near miss/good catch reporting program, which is designed to identify hazards and incidents in the field that do not result in injury or illness. Identification and reporting of near misses and good catches requires assessment of the job site for unsafe or hazardous conditions on a daily basis, which both raises personnel awareness of those conditions, and allows pre-emptive corrective action to be taken to reduce the hazards, which in turn reduces the number of incidents that occur.

Standard policy at Louis Berger requires that all project-related injuries and illnesses that occur on a project must be immediately reported to both the project manager and the Louis Berger Health and Safety office, as well as Liberty Mutual, Louis Berger's designated external medical support and case management system. All incidents are documented on Louis Berger standardized forms tailored for the specific incident (first report, illness and injury, vehicle accident), and all forms are submitted to Health and Safety and retained on file. Louis Berger will notify the appropriate personnel at the DPMC within 24 hours of any incident. The appropriate team personnel to notify will be established at the inception of each project and will be listed in the HASP. All Louis Berger personnel and subcontractors will follow all DPMC safety policies and protocols, and ensure that employees have the required training before commencing work on the project.

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G Project Schedule

The project will be scheduled immediately upon written notice to proceed and a contract is executed. Background research and project design will be completed within 30 days. The DPMC project team will then have seven calendar days to review and respond. The geomorphological investigation and Phase I archaeological fieldwork will be completed within 45 calendar days. A management summary will be submitted to the DPMC project team for review within seven calendar days of fieldwork completion. The DPMC project team will then have seven calendar days to review and respond. If needed, Louis Berger will provide a revised management summary within seven calendar days of receiving DPMC's response. The draft Phase I report will be submitted to the DPMC project team for review within 90 calendar days of receiving DPMC's response to the management survey. The DPMC project team will then have 30 days to review and respond. Louis Berger will submit the final report, the GIS data, and the final invoice and close-out forms within 29 days of receiving DPMC's response.

Louis Berger understands the schedule is aggressive and that it is imperative that the project closes out within 246 days of project initiation. In order to meet this schedule, the areas to be tested will be divided up into study sub-areas and the field data will be sent for analysis and reporting on a weekly basis. Organizing the fieldwork into sub-areas will allow for analysis and reporting to occur concurrently with the fieldwork.

Below is the Louis Berger team's proposed schedule as described above.

PROJECT SCHEDULE	SEP		OCT			NOV		DEC			MAR		APR		MAY
	9/7	9/11	10/5	10/12	10/15	11/1	11/28	12/7	12/14	12/21	3/1	3/12	4/1	4/11	5/10
PROJECT INITIATION															
Project Award/Contract Execution															
Kick-off Meeting held															
PHASE I: ARCHAEOLOGICAL CONTEXT BACKGROUND RESEARCH AND PERMITTING															
Research/Project Design (30 days)															
DPMC Project Team Response (7 days)															
PHASE II: FIELD INVESTIGATION AND SURVEY															
Geomorphological Investigation and Phase I Archaeological Fieldwork (45 days)															
Phase I Archaeological Survey and Geomorphological Investigation Management Summary (9 days)															
DPMC Project Team Response (7 days)															
Revised Management Summary (if needed) (7 days)															
PHASE III: ANALYSIS AND REPORTING															
Phase I Archaeological Survey Report (Draft) (90 days)															
DPMC Project Team Response (30 days)															
Phase I Archaeological Survey Report (Final) (29days)															
PROJECT CLOSEOUT															
Curation															
GIS data layers and SHP files															
Final Invoice and Close-Out Forms															