

**VIRGINIA DEPARTMENT OF HISTORIC RESOURCES
PERMIT APPLICATION FOR ARCHAEOLOGICAL EXCAVATION OF HUMAN REMAINS**

Please print or type all information. If a request does not apply to your project, please print or type "N/A" in the space provided. If additional space is required, please attach as many extra sheets as necessary. Failure to provide a complete application (including requested attachments) will result in denial of the requested permit. Please forward any questions to Joanna Wilson Green (telephone 804-482-6098, email joanna.wilson@dhr.virginia.gov).

1. APPLICANT'S NAME AND CONTACT INFORMATION:

Name/Title: Mr. David Van Patten, Board of Trustees Chair
Company/Organization/Affiliation: Central United Methodist Church
Street Address: 4201 Fairfax Drive
City/State/ZIP: Arlington, Virginia 22203
Mailing Address: Same as above
Telephone No.: (703) 527-8844 Fax No.: (703) 524-6303
Email: office@cumcballston.org

PROPERTY OWNER'S NAME AND CONTACT INFORMATION (if different from above)

Name/Title: _____
Company/Organization/Affiliation: _____
Street Address: _____
City/State/ZIP: Same as above
Mailing Address: _____
Telephone No.: () _____ Fax No.: () _____
Email: _____

ARCHAEOLOGICAL CONTRACTOR'S CONTACT INFORMATION:

Principal Name/Title: Boyd Sipe/Manager -- Thunderbird Archeology
Company/Organization/Affiliation: Thunderbird Archeology/Wetland Studies and Solutions, Inc.
Street Address: 5300 Wellington Branch Drive, Suite 100
City/State/ZIP: Gainesville, Virginia 20155
Telephone No.: (703) 679-5623 Fax No.: (703) 679-5601
Email: bsipe@wetlandstudies.com

2. PROPERTY INFORMATION:

Name/title of property on which excavation will take place: Central United Methodist Church
County/independent city: Arlington (County)
State archaeological inventory number: N/A
State architectural inventory number (if different from above): 000-7838

3. IS THIS APPLICATION PART OF A COURT-ORDERED REMOVAL? Yes: No:

(if yes) Clerk's name/telephone no: Paul Ferguson 703-228-7010
City/County: Arlington Docket Number: Case No. CL16-2543

4. ARE YOU APPLYING AT THE DIRECTION OF A LOCAL GOVERNMENT, OR STATE OR FEDERAL AGENCY? Yes ___ No X Specify: N/A
5. IS THIS ACTION PART OF A PROJECT PREVIOUSLY REVIEWED OR CURRENTLY IN REVIEW BY THE DEPARTMENT OF HISTORIC RESOURCES? Yes ___ No X
DHR project review number (if applicable) N/A
6. IS A PERMIT REQUESTED IN ANTICIPATION OF THE DISCOVERY OF HUMAN REMAINS (BUT NO DISCOVERY HAS YET BEEN MADE)? Yes X No ___
If yes, describe the factors that suggest the presence of human burials on the subject property (attach additional pages as necessary):

The extant church was built on the historic 19th-century Robert Ball, Sr. family burying ground. On October 30, 1922, at the Circuit Court of Arlington County, Virginia, it was stated that if graves were found during a realignment of Clements Avenue (present-day Stafford Avenue), they should be reinterred within the Robert Ball, Sr. graveyard. Research regarding the Ball family, church, local cemeteries, and transportation has yet to yield new information about what occurred during and after the realignment of Clements Avenue (present-day Stafford Avenue). As such, it is possible that unmarked graves are present within the church property associated with that undertaking. Thunderbird Archeology reviewed cemetery records for direct descendants of Robert Ball, Sr., and, so far, has determined that there is potential for at least six marked and three unmarked burials.

7. IS A WAIVER OF THE PUBLIC NOTICE REQUIREMENT REQUESTED? Yes ___ No X
If yes, describe the specific threat(s) to the human remains and associated funerary artifacts and why this/these threat(s) justify the requested waiver (attach additional pages as necessary):

N/A

8. CURATION INFORMATION:

Name of facility providing temporary housing of human remains and associated funerary artifacts:
Towson University, College of Liberal Arts Building / Thunderbird Archeology (Wetland Studies and Solutions, Inc.)

Type of facility: Archaeology and Forensic Science Laboratory / Archeology Laboratory

Street address: 8000 York Road, LA2213A / 5300 Wellington Branch Drive, Suite 100

City/State/ZIP: Towson, Maryland 22152 / Gainesville, Virginia 20155

Name of contact person for facility: Dana Kollmann, PhD. / Boyd Sipe, M.A., RPA

Contact telephone number: (410) 704-2350 (Kollmann) Email: dkollmann@towson.edu

(703) 679-5623 (Sipe)

bsipe@wetlandstudies.com

Name of facility providing curation for original field notes and documentation (if different):

Thunderbird Archeology (Wetland Studies and Solutions, Inc.)

Type of facility: Secure office building

Street address: 5300 Wellington Branch Drive, Suite 100

City/State/ZIP: Gainesville, Virginia 20155

Name of contact person for facility: Boyd Sipe

Contact telephone number: (703) 679-5623 Email: bsipe@wetlandstudies.com

9. REBURIAL INFORMATION:

Location for reburial (if known): Columbia Gardens Cemetery

Street address: 3411 Arlington Boulevard

City/State/ZIP: Arlington, Virginia 22201

10. IS A REBURIAL PLAN IN PLACE? Yes X No ___

If yes, specify and explain. If no, explain how you plan to approach this issue with descendants and/or other interested parties (attach additional pages if necessary).

Disinterred burials will be reinterred in the Columbia Gardens Cemetery in Arlington, Virginia, where other members of the Ball family are currently buried, and will be reinterred in a decent and respectful manner, together with the other disinterred burials from the Central United Methodist Church property, in the same section of the Columbia Gardens Cemetery. Specific details regarding the reinterment process will be determined in consultation with any interested Ball family descendants and the project's stakeholders.

11. IS A DISPOSITION OTHER THAN REBURIAL PROPOSED? Yes ___ No X

If yes, complete the attachment found on page 7 (*Justification for Alternative (Non-Reburial) Disposition*)

N/A

12. EXPECTED END DATES:

Excavation: 19-Dec. -16 (marked Grave Area); 31-Oct. -17(Construction Monitoring Area)

Osteological Analysis: 28-Feb. -17 (marked Grave Area); 31-Dec. -17(Construction Monitoring Area)

Preparation and submittal of final report: 31-Mar. -17 (marked Grave Area); 31-Jan. -18(Construction Monitoring Area)

Final Disposition: 30-Apr. -17 (marked Grave Area); 28-Feb. -18(Construction Monitoring Area)

APPLICANTS MUST SIGN

I hereby apply for the permit for the activities described herein. By my signature I hereby certify that I possess adequate resources, financial and otherwise, to ensure that the archaeological project is carried out in its entirety, up to and including the respectful recovery, temporary housing, and reburial or alternative disposition of any and all human remains and associated funerary artifacts recovered pursuant to the permit requested. I understand that work conducted under the permit is not complete until all permit requirements are met, including but not limited to submittal and approval of reports and documentation. I further understand that failure to complete the conditions of the permit within the allotted timeframe, or to obtain an extension of that timeframe from the Department, may result in revocation of the permit and constitute grounds for denial of future permit applications.

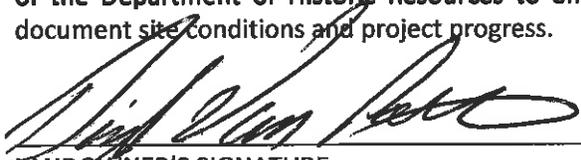
I hereby certify that the information submitted in this application is true and accurate to the best of my knowledge, and that I understand my responsibilities with regard to satisfaction of permit conditions and respectful treatment of any and all human remains recovered pursuant to a permit issued to me.


APPLICANT'S SIGNATURE

10/7/16
DATE

CONFIRMATION OF LANDOWNER PERMISSION

As legal owner of the property upon which the permitted archaeological excavation will take place, I hereby agree to allow the project archaeologist, project physical anthropologist, and all associated professionals to perform the archaeological excavation and recovery of any human remains and associated funerary artifacts from the property. I also agree to allow the duly authorized representatives of the Department of Historic Resources to enter the property at reasonable times to inspect and document site conditions and project progress.


LANDOWNER'S SIGNATURE

10/7/16
DATE

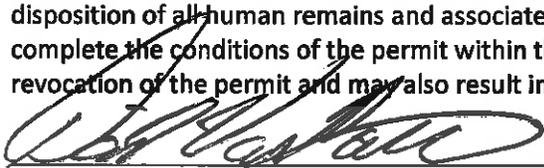
APPLICANT'S AND CONTRACTOR'S ACKNOWLEDGEMENT FORM

I, David Van Patten, Board of Trustees Chair, have contracted with Boyd Sipe, Manager -- Thunderbird Archeology
Applicant's Name Contractor's Name/Title

to perform the work described in the above application signed by me and dated 10-7-16.

We, the undersigned, hereby confirm that we will ensure the respectful and honorable treatment of any and all human remains and associated funerary artifacts from the time of their discovery through the archaeological recovery process, temporary housing, and reburial or agreed-upon alternate disposition. We understand that failure to treat human remains and associated funerary artifacts with respect at all times will result in revocation of the burial permit and possible legal action.

By our signatures we hereby confirm that we will read and abide by all condition and terms set forth in the approved permit as required for all actions described in this application. We understand that work conducted under a burial permit will not be considered complete until all documentation is submitted and approved by the Department, and that all other conditions are met including the respectful disposition of all human remains and associated funerary artifacts. We further understand that failure to complete the conditions of the permit within the specific timeframe or approved extension may result in revocation of the permit and may also result in denial of future permit applications.


Applicant's Signature

10/7/16
Date


Contractor's Signature and Title
Boyd Sipe M.A., RDA
MANAGER - ARCHAEOLOGY

10-7-16
Date

RESEARCH DESIGN

For projects in which human remains may be encountered but will not be purposefully disturbed or excavated, please provide a research design describing the larger project and including methodology to be implemented in the event that human remains are encountered.

For projects involving the excavation of human gravesites and recovery of human remains and funerary artifacts, please provide a data recovery plan.

Documents shall include, at minimum, the following information:

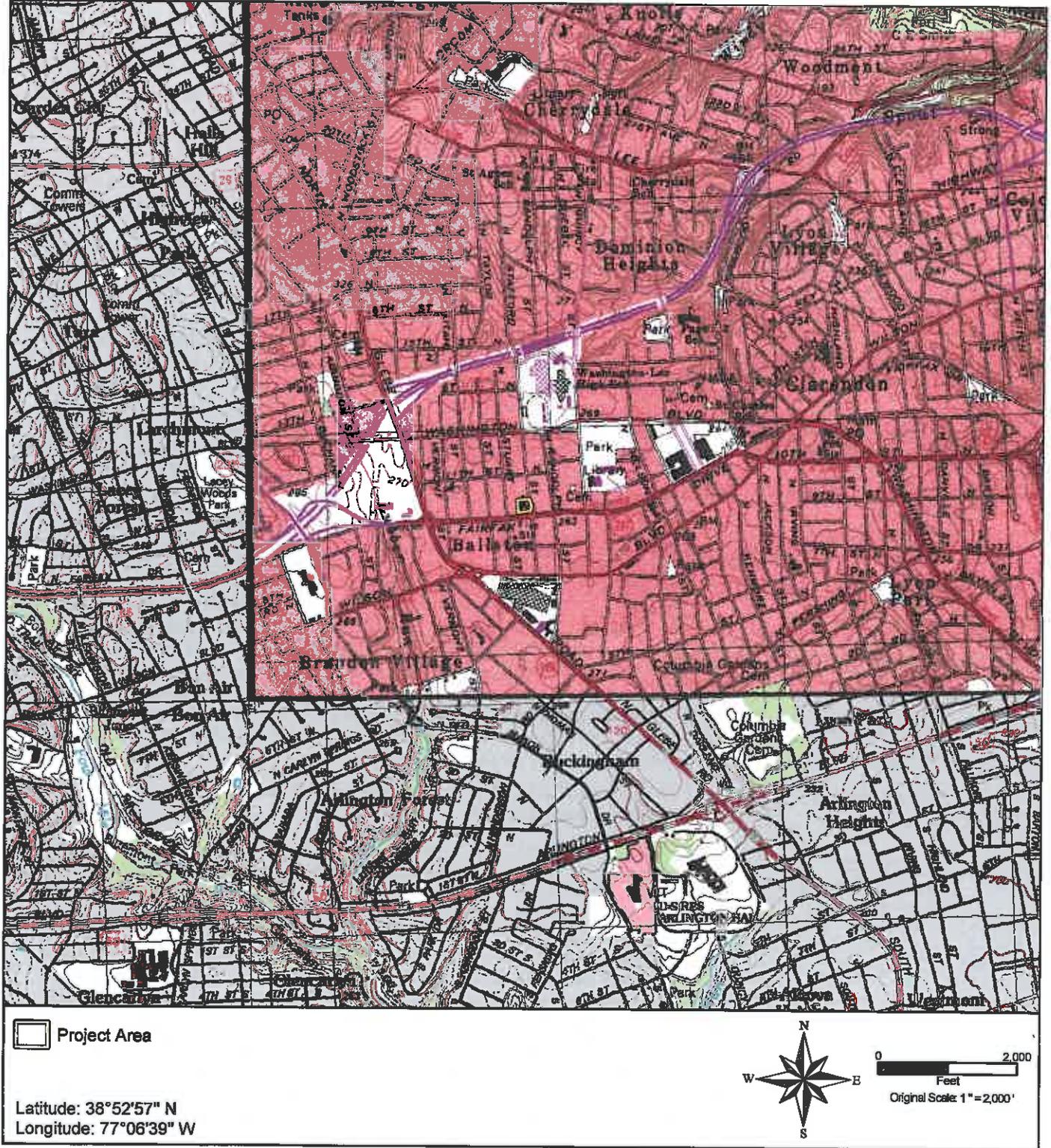
1. Reference to professionally-accepted standards, practices, methodologies, etc.;
2. Archival research pertinent to the location, type, and age of the resource in question;
3. Field and laboratory methodologies and documentation (data recovery plans must include specific discussion of the types of funerary data to be obtained);
4. Osteological inventory, analyses, and documentation (when applicable);
5. Conservation methods (when applicable).

Add additional pages as necessary.

JUSTIFICATION FOR ALTERNATIVE (NON-REBURIAL) DISPOSITION
Add additional pages as necessary

REQUIRED ATTACHMENTS

- Copy of the relevant USGS 7.5 series topographic map showing the location of the property or site on which the archaeological excavation will take place. A supplemental map showing the area in greater detail may also be attached if appropriate and/or necessary.
- Original signed application.
- Original signed Statement of Landowner Permission.
- Original signed Applicant's and Contractor's Acknowledgement Form.
- Text of the public notice/notice of intent, and confirmation of publication (print and online). See guidelines for further information and explanation.
- Curriculum vitae (CVs) for the principal archaeologist and physical anthropologist associated with the proposed project.
- Detailed research design, including but not limited to the following:
 - field methods to be used during recovery
 - laboratory methods to be used during skeletal analysis
 - conservation methods to be used for both human skeletal remains and associated funerary artifacts.
- Statement justifying alternative disposition of human skeletal remains and associated funerary artifacts (if applicable).



USGS Quad Map Washington West, DC-MD-VA 1983

Permit for the Archaeological Excavation of Human Remains

Central United Methodist Church



Page #

Manager-Archeology



Firm Association
Wetland Studies and
Solutions, Inc. (WSSI)
Direct Phone Line
(703) 679-5623

Project Assignment
Principal Archeologist

Years of Experience
With this firm: 10
With other firms: 5

Education
M.A./Archaeology and
Heritage/The University of
Leicester

**Registrations &
Certifications**
2015/Register of Professional
Archaeologists

HAZWOPER Hazardous
Materials Technician Training

2015/HAZWOPER 8-Hour
Review

Associations
Council of Virginia
Archaeologists

**Prince William County Schools 12th High School Site
(Prince William County, VA)**

Mr. Sipe served as project manager for the archeological cemetery investigations at site 44PW1947. This project included archeological cemetery delineation, archival research, preparation and processing an application with the Virginia Department of Historic Resources, the archeological removal of human remains from the cemetery under said permit, analysis and data recovery reporting, and coordination with agency staff, media, and possible descendant families, and arrangement for reinterment of remains at another location on the site.

A total of eleven burials were recovered from the site. Based on the archeological evidence, the burials located within the cemetery date to the period post-1850 to post-1880. Archival records do not clearly mention the cemetery, its occupants, or its exact location, and the individuals at site 44PW1947 may never be positively identified. However, based on the available evidence, at least some of the individuals were possibly associated with the family of William and Cordelia Lynn, who owned the land containing the cemetery during this time period, and/or possibly with the tenants that leased the property when the Lynn family moved to Washington DC.

**Arlington National Cemetery Stream Restoration Millennium Project
(Arlington, VA)**

Mr. Sipe served as Project Manager for the cultural landscape documentation related to the expansion of Arlington National Cemetery (known as the Millennium Project) and the future restoration of 1,700 lf of badly degraded stream channel that flows through the site. As part of the environmental and preservation compliance process, pursuant to compliance with Section 106 of the National Historic Preservation Act of 1966 and regulations in 36 CFR Part 800, documentation of the cultural landscape of the Millennium Site has been included in a Memorandum of Agreement (MOA) between ANC, the National Park Service (NPS), and the Virginia State Historic Preservation Officer to mitigate adverse effects. Mr. Sipe oversaw sub-contractors EHT Traceries in these efforts.

**Contrabands and Freedmens Cemetery Memorial
(City of Alexandria, VA)**

Under a Memorandum of Agreement between the City of Alexandria, Virginia, the Virginia Department of Transportation, the Federal Highways Administration, and other consulting parties, data recovery excavations were conducted in 2007 at the Contrabands and Freedmen's Cemetery (Site 44AX179), a burying ground established by the federal government for the city's wartime African American refugees from slavery. The site also included significant Native American components dating from the Paleoindian through Woodland prehistoric periods. Based on Mr. Sipe's expertise in the interpretation and documentation of archeological resources, WSSI was awarded the contract to complete research, analysis, and the final data recovery report. Thunderbird Archeology was also contracted to assist with public interpretation for the memorial. Mr. Sipe assembled a multi-disciplinary team to design the City's official website and historical brochure for the site. He authored all text for the web and assisted in the brochure design and layout. Finally, Mr. Sipe managed additional excavations and supervised archeological monitoring during construction of the Memorial.



Firm Association
Wetland Studies and Solutions, Inc. (WSSI)

Project Assignment
Principal Historian

Years of Experience
With this firm: 1
With other firms: 12

Education
2003/M.U.E.P., Urban and Environmental Planning, Certificate Historic Preservation, University of Virginia

2000/B.A.H., Architectural History, Minor Architecture, University of Virginia

Registrations & Certifications
2015/Section 106/ Agreement Documents/ NPI

2014/Certified Zoning Official/ Virginia Association of Zoning Officials

2012/Section 106 Training (Ohio Office of Environmental Services)/ Ohio Department of Transportation

2012/Section 4(f) Training (Ohio Office of Environmental Services)/ Ohio Department of Transportation

Associations
American Planning Association
Preservation Leader Forum
Society of Architectural Historians

Anna Maas joined Wetland Studies and Solutions, Inc. (WSSI) in March 2015. Notable projects from her early career include the successful National Register nominations of the towns of Boynton and Appomattox while with the Virginia Department of Historic Resources. She has also contributed to archaeological investigations at George Rogers Clark's final residence, Locust Grove, in Louisville, Kentucky and to the River Road Scenic Byway Corridor Management Plan in Louisville, which received the 2011 Outstanding Plan Award from the Kentucky Chapter of the American Planning Association. Ms. Maas is a certified Zoning Official with qualifications that exceed the Secretary of the Interior's Standards for professional architectural historians. She serves as the principal investigator on architectural history surveys and contributes to all phases of archaeological investigations and planning projects.

Ms. Maas' relevant experience includes:

Architectural Reconnaissance Survey & Preliminary Information Form (PIF) Preparation - Highland Springs, Henrico County, Virginia

Serving as the Principal Investigator on a survey of 240 representative historic properties with historian Sherri Marsh Johns. The survey area contains homes, churches, civic buildings, and 40-to-50 commercial properties in this early streetcar suburb of Richmond. Historic maps geo-referenced by GIS staff assisted in identifying which properties to survey. Prepared a Preliminary Information Form (PIF) to evaluate the proposed Highland Springs Historic District potential for listing. Prepared for Henrico County and DHR Cost-Share Program.

Documentary Study, Windmill Hill Park - City of Alexandria, Virginia

Developed an illustrated history of land use and occupants based on primary document research in anticipation of a Phase I archeological survey. Once part of the Potomac River, the land was created in the early 19th-century with a portion of the hulk of the early 19th-century sailing ship Young Hero. The land was used by a variety of local and national investors in the shipping and rail industry. One architectural resource, a ca 1960 concrete bulkhead was recorded and recommended not eligible. Prepared for the City of Alexandria, Department of Recreation, Parks and Cultural Activities.

Documentary Study and HABS Documentation, Ramsey Homes - City of Alexandria, Virginia

Ms. Maas and associate archeologist developed an illustrated history of land use and occupants based on primary document research and coordinated with a large-format photographer and Encore Sustainable Design to prepare measured drawings. The Ramsey Homes were designed and built between 1941 and 1942 as public housing for African-American defense workers and were dramatically altered in the late 20th century. Prepared for Alexandria and Redevelopment Housing Authority.

Property History, 226 The Strand - City of Alexandria, Virginia

Ms. Maas served as Principal Investigator to determine the date of construction and sequence of alterations at a waterfront warehouse in Old Town Alexandria. She and associate archeologist developed an illustrated history of construction and occupants based on deeds, tax records, city directories, building permit records, historic maps and aerials, and historic photographs. The date of construction was determined to be after a major fire in 1897. Prepared for EYA, Bethesda, Maryland.

Age Assessment and Recommendation of Eligibility for the National Register of Historic Places, Manor House and Cottage at Airlie Center - Fauquier County, Virginia

Surveyed the Manor House, adjacent cottage, small domestic outbuilding, swimming pool, rock fencing, agricultural outbuildings, tennis courts, and well. Conducted archival research to establish the date of construction of a house occupied by Dr. Murdock Head from 1960 until his death. Date was determined by field survey and finding a 1911 real estate advertisement. Prepared for Airlie Center.

Intensive Survey, National Register Nomination, and Educational Brochures, Conrad-Seaton House and Archaeological Site, Jefferson County, Kentucky.

Conducted an intensive survey of an 1803 vernacular Georgian house associated with early, prominent redware potter, Valentine Conrad, in Jeffersontown, a present-day suburb of Louisville. In concert with ongoing archaeological investigations of the kiln with school groups and the public, developed a timeline of the building and co-wrote the nomination and public interpretation documents. Prepared on behalf of Falls of the Ohio Archaeological Society, which received a grant from the SHPO. Listed 2011.

Firm Association
Wetland Studies and
Solutions, Inc. (WSSI)

Project Assignment
Senior Associate Archeologist

Years of Experience
With this firm: 10
With other firms: 2

Education:
MSc in European Archaeology,
The University of Edinburgh

B.A. in Anthropology, George
Mason University

Registrations &
Certifications

2016/Registered Professional
Archeologist

2016/8-Hour HAZWOPER
Hazardous Materials
Technician Review

24-Hour HAZWOPER
Hazardous Materials
Technician

Mr. Smith's relevant experience includes:

Stable Hill Property – Henrico County, Virginia

Mr. Smith served as a field supervisor during a cemetery investigation and delineation conducted within a ± 0.13 -acre portion of the greater ± 47.6 -acre Stable Hill development property. The purpose of the delineation was to determine the absence or presence of any grave shaft features, or other cemetery-related features, within the purported location of a cemetery recorded on the 1958 plat map. Mr. Smith directed the mechanical removal of overburden soils with a backhoe at the purported cemetery location, which resulted in the identification of eight adult and 15 sub-adult or children burials. Additionally, Mr. Smith authored a memorandum detailing the results of the investigation.

Heritage Baptist Church Property – Loudoun County, Virginia

Mr. Smith served as a field supervisor during a cemetery investigation and delineation of an approximately a ± 0.11 -acre portion of the circa 1.2-acre Heritage Baptist Church property, where one grave was known to be present within the footprint of a proposed new construction. Mr. Smith guided mechanical excavations to determine the presence or absence of any additional graves in the vicinity of the previously identified burial. As a result of Mr. Smith's fieldwork, 11 additional grave shaft features were identified; six adult and five sub-adult or children burials.

12th High School Property – Prince William County, Virginia

Mr. Smith served as a field supervisor during a cemetery investigation and delineation conducted of a ± 0.15 -acre parcel within the greater ± 110 -acre 12th High School property and authored a memorandum detailing the results of the investigation. A cluster of 12 likely grave depressions and 12 fieldstone grave markers were previously documented at the cemetery location. Mr. Smith guided and monitored backhoe trenching around the cemetery location to determine the absence or presence of any additional grave shaft features, or other cemetery-related features, associated with the previously identified grave features. No additional graves were identified as a result of the delineation fieldwork.

Columbian Harmony Cemetery – Washington, D.C.

Mr. Smith served as a field supervisor during a cemetery investigation conducted in advance of redevelopment of the ± 0.52 acre Israel Senior Residences Housing Site in NE Washington, D.C. The purpose of the investigation was to confirm the completeness of a 1960 mass disinterment of the Columbian Harmony Cemetery and to remove any human remains that might still be present within the proposed building footprint. A total of 231 grave features were identified, of which 193 contained human remains which were then disinterred.

Elizabeth Waters Johnson, M.A.

Laboratory Supervisor/Associate Archeologist



Firm Association

Wetland Studies and Solutions, Inc. (WSSI)

Direct Phone Line:
(703) 679-5690

Project Assignment

Laboratory Supervisor

Years of Experience

With this firm: 8

With other firms: 3

Education

M.A./Anthropology
concentration in Museum
Training/The George
Washington University

B.A./Anthropology/
concentration in Archaeology/
Fort Lewis College/

Registrations & Certifications

2014/American Red Cross
Standard First Aid

2014/American Red Cross
Adult CPR/AED

2015/Introduction to MS
Access

Associations

Middle Atlantic Archeological
Conference

Lyndam Hill II Property (44FX0223) (Fairfax County, VA)

Ms. Johnson served as Laboratory Assistant during the Phase II site evaluation and Phase III data recovery of site 44FX0223, a circa 1720 to 1769 outlying farm quarter site in Fairfax County, Virginia. She assisted in the analysis and cataloguing of the artifact assemblage, in addition to analyzing and cross-mending the large colonoware assemblage. The site consisted of intact historic features and artifact deposits, and indicated the discrete locations of an overseer's house and a dwelling for enslaved laborers, a unique and rarely identified site type in Virginia. Major research issues in the archeology of regional slavery including the lifeways and material culture of the enslaved and overseers, ethnicity, agency, and plantation provisioning were re-considered in view of findings at the site.

Sites 44FX1808 and 44FX1904 In Support of BRAC Infrastructure on Fort Belvoir Property (Fairfax County, VA)

Ms. Johnson conducted the artifact analysis and inventory for the Phase II work. The Phase II evaluations of sites 44FX1808 and 44FX1904 indicated that the sites represent short term occupations for the procurement and processing of lithic materials with Early to Middle Woodland and Late Archaic temporal components. It was determined that the sites had been plowed and thus any stratified cultural deposits had been destroyed. No further archeological work was recommended.

The Thomas Brawner Gaines Farmstead (Site 44PW1662) (Prince William County, VA)

Ms. Johnson conducted artifact analysis and inventoried finds for the Phase III data recovery. Field investigations resulted in the recovery of a large assemblage of artifacts representing the mid-19th century domestic, farmstead, military, and military/medical components of the site. Forty-eight cultural features, many of which were likely associated with the mid-19th century occupations of the site were identified. Key historic features included the foundation of the mid-19th century Gaines house, a stove pit possibly associated with the farmstead's meat house and a refuse pit associated with both the mid-19th century domestic and Civil War era military use of the site. Data recovery at the site contributed to our knowledge of the locally significant Gaines family and to the local history of the Town of Gainesville, its establishment in the mid-19th century and its role in the Civil War.

I-95/395 Hov/Bus/Hot Lanes Project - Arlington, Fairfax, Prince William, Stafford, Spotsylvania Counties And The Cities Of (Alexandria and Fredericksburg, VA)

Ms. Johnson served as field archeologist and conducted a portion of the artifact analysis for a Phase I Archeological Investigation of the circa 55.5-mile long I-95/I-395 HOV/BUS/HOT Lanes Project. Most of the archeological work consisted of testing within or near the median areas; however, smaller areas located outside and parallel of the medians that will sustain construction impacts from the highway work were also studied. Twenty-six previously recorded sites, one historic district, and two historic resources were either wholly or partially located within the APE for this project; fifteen of the previously recorded archeological sites had been destroyed. Thirty-six new archeological sites were recorded during this survey. Of these sites, seven were recommended for avoidance or Phase II evaluation.



PROFESSIONAL PROFILE: MATTHEW S. TURNER, P.G.

ADDRESS AND TELEPHONE:

GeoModel, Inc.
PO Box 1320
Leesburg, VA 20177
(703) 777 9788 Phone
(703) 777 3814 Fax

SUMMARY OF PROFESSIONAL EXPERIENCE:

Mr. Turner is a professional geologist and geophysicist and has managed a diverse range of geophysical projects worldwide. Mr. Turner has over twenty years of professional geological and geophysical experience with commercial and governmental clients, and is an expert in ground penetrating radar, geophysical, and utility locating surveys. Mr. Turner has conducted numerous ground penetrating radar (GPR), electromagnetic conductivity (EM) and geophysical surveys in the United States, Hawaii, Alaska, Japan, Africa, the Middle East, Jamaica and Mexico.

PROFESSIONAL HISTORY:

- | | |
|----------------|---|
| 1991 - Present | GeoModel, Inc.
Senior Scientist and Project Manager for a geophysical consulting and geological firm. Mr. Turner has conducted numerous ground penetrating radar (GPR) and other geophysical surveys worldwide. |
| 1987 - 1991 | Earth Resources Corporation
Senior Project Manager for a company specializing in earth management services. Supervised and conducted numerous geophysical surveys including EM and GPR surveys. |
| 1983 - 1987 | Technos, Inc.
Project Manager for a geophysical consulting firm. Conducted numerous EM and GPR geophysical investigations. |
| 1980 - 1983 | Fort Hays State University
Teaching assistant for mineralogy, petrology, and field methods at a major Kansas university geology department. |
| 1977 - 1980 | Western Technologies, Inc.
Engineering Geologist for a geotechnical consulting firm in the Las Vegas, Nevada area. |

PROFESSIONAL HISTORY (Continued):

- 1975 - 1976 **Holosonics, Inc.**
Geophysicist operating downhole geophysical logging equipment along the Alaska Pipeline.
- 1973 - 1975 **Fugro, Inc.**
Geologist, conducted numerous geologic investigations. Conducted geologic mapping of numerous sites.

CREDENTIALS:

Master of Science (M.S.), Fort Hays State University, Kansas, 1983, Major in Geology.
Bachelor of Science (B.S.), Northern Arizona University, 1973, Major in Geology.

40-Hour Hazardous Waste Site Workers Training Course for Hazardous Waste Operations and Emergency Response, as required by OSHA 1910.120.

PROFESSIONAL AFFILIATIONS:

Certified Professional Geologist, Virginia, No. 343
Registered Professional Geologist, Georgia, No. 1198
Registered Professional Geologist, Florida, No. 517
Certified Professional Geologist, Alaska, No. 81

KEY PROJECTS:

Ground Penetrating Radar (GPR) survey, Brownstown, Pennsylvania. Conducted field survey for an archaeological study to locate foundations and historic remnants on the 0.5 acre Hellburg Archaeological site in Brownstown, PA. Numerous foundations, possible buried structures, buried debris, and a mill race were located and mapped.

Ground Penetrating Radar (GPR) survey, Leesburg, Virginia. GPR data processing and interpretation for an archaeological study at the North Springs Behavioral Hospital, to locate possible old walls, structures, foundations, and gravesites.

Ground Penetrating Radar (GPR) survey, Palmetto, Florida. Analyzed GPR data for an archaeological study to locate old walls and foundations at the historic Gamble Sugar Cane Mill just off State Highway 683 (near 1903 Ellenton-Gillette Road) in Palmetto, Florida.

Ground Penetrating Radar Survey, Menorah Gardens, Florida. Conducted 3-D modeling of ground penetrating radar data to locate and map hundreds of gravesites at cemeteries in Palm Beach Gardens and Fort Lauderdale.

KEY PROJECTS - CONTINUED:

Port Royal, Jamaica. Conducted ground penetrating radar survey for archeological survey in Jamaica. Coordinated with the Jamaica National Trust during project. Participated in News Conference to discuss results.

Warri, Nigeria, Africa. Conducted geophysical and ground penetrating radar (GPR) surveys for Mosunmolu Ltd. at the Shell Petroleum Development Company of Nigeria Limited, Warri to locate contaminated soil. Presented findings to Royal Dutch Shell personnel at project meeting.

Abu Dhabi, United Arab Emirates (U.A.E.). Conducted a groundwater study for Nasa International Group at the Abu Dhabi Golf Course, including a ground penetrating radar survey to map groundwater under site.

PROFESSIONAL REPORTS AND PUBLICATIONS:

"Ground Penetrating Radar and Visualization" GeoInformatics Magazine, August/ September 2004 (online) Issue.

"Ground Radar" RF Innovations Magazine, Issue 15, May/June 2002.

"The Importance of a Complete Understanding of the Geology at Contaminated Sites," The Professional Geologist, Volume 32, Number 10, September 1995.

"A Systematic Approach for Assessing Groundwater Contamination Sites," presented at the 17th Environmental Symposium, American Defense Preparedness Association, Atlanta, Georgia, April 1990.

"Assessing Contamination at and Treatment for a Low-pH Leachate Plume," Hazardous Materials Control, May-June 1989.

"Contaminant Assessment and Remedial Action for a Low pH Leachate Plume in a Surficial Aquifer," Second National Outdoor Conference and Exposition, NWWA, Las Vegas, Nevada, May 1988.

"Characterization of Groundwater Contamination by Direct Sampling Through Hollow Stem Augers," Second National Outdoor Conference and Exposition, NWWA, Las Vegas, Nevada, May 1988.

"The Use of Surface and Downhole Geophysical Techniques to Characterize Groundwater Flow in a Fractured Bedrock Aquifer System," Second National Outdoor Conference and Exposition, NWWA, Las Vegas, Nevada, May 1988.

"Auditing Existing Monitor Wells," FOCUS Conference on Southeastern Groundwater Issues, Tampa, Florida, October 1986.

PROFESSIONAL REPORTS AND PUBLICATIONS - CONTINUED:

"In-Situ, Time-Series Measurements for Long-Term Groundwater Monitoring," ASTM Symposium on Field Methods for Groundwater Contamination Studies and Their Standardization, Cocoa Beach, Florida, February 1986.

"Correlation Between Field Geophysical Measurements and Laboratory Water Sample Analysis," Fifth National Symposium and Exposition on Aquifer Restoration and Groundwater Monitoring, Columbus, Ohio, May 1985.

"Quantitative Geomorphology of the North Fork Big Creek Drainage Basin," Ellis County, Kansas, 115th Annual Meeting, Kansas Academy of Science, Atchison, Kansas, March 1983 (Masters' Thesis).

NEWS MEDIA

Fox News- 2005 TV Interview, Mr. Turner was interviewed by Greta Van Susteren of FOX NEWS on July 28, 2005 concerning Ground Penetrating Radar and its use in Aruba.

Court TV- 2005 TV Interview, Mr. Turner was interviewed by Catherine Crier of Court TV on July 28, 2005 concerning Ground Penetrating Radar in Aruba.

WTKR- 2005 TV Interview, Mr. Turner was interviewed by WTKR on February 12, 2005 in Chesapeake, Virginia concerning the use of GPR to locate a landfill under some homes.

Newspaper Article- August 27, 2004 article in the Georgetown Times, Georgetown, South Carolina. Article discusses Mr. Turner's August 25th 2004 court appearance as an expert witness on Ground Penetrating Radar in the lawsuit of Pate vs. Belle W. Baruch Foundation.

2004 TV Interview, "Search for Lost Drainage Well" in Polk County, Florida. Mr. Turner was interviewed by Bay News Channel 9 -TV on May 24, 2004 to discuss locating a lost drainage well using geophysical methods.

2004 TV Interview, Mr. Turner was interviewed by WFTV Channel 9, Orlando on March 26, 2004, concerning location of gravesite using GPR on Ormond Beach, Florida.

Newspaper Article- December 4, 2002 article in Loudoun Times-Mirror, Leesburg, Virginia. Matthew Turner discusses Ground Penetrating Radar and the interview with CNN.

CNN- 2002 TV Interview with David Ensor of CNN. Mr. Turner discussed Ground Penetrating Radar and its use in Iraq to locate WMD's. TV Interview was aired on November 11, 2002 on CNN's "Wolf Blitzer Reports" program.

1999 News Conference, Jamaica, Mr. Turner participated in a news conference in Port Royal Jamaica discussing the results of a Ground Penetrating Radar survey to locate the ruins of Old Port Royal City, Jamaica. News conference reported in January 22, 1999 issue of Weekend Observer Newspaper.

EXPERT WITNESS AND COURT TESTIMONY

Pate vs. Belle W. Baruch Foundation- Mr. Turner was called to testify in court as a ground penetrating radar (GPR) expert witness in a case involving a buried inlet in South Carolina. Mr. Turner also gave a deposition for the ground penetrating radar work conducted by GeoModel, Inc. at the inlet site.

Conrail vs. American Premier Underwriters- Mr. Turner signed an affidavit for ground penetrating radar work conducted by GeoModel, Inc. for Blank, Rome, Cominsky, McCauley LLP, Attorneys at Law. GPR work was used to delineate areas of buried debris at a rail yard in Hollidaysburg, PA.

Menorah Gardens Cemetery, Florida- Mr. Turner obtained ground penetrating radar information on gravesites for Hunton & Williams Attorneys at law for a court case involving SCI Corporation and the Menorah Gardens Cemetery in Florida.

Cemetery Dispute, Maryland- Conducted ground penetrating radar survey to assist Ayres, Jenkins, Gordy & Almand, P.A. in a court case involving a former cemetery in Maryland.

Dr Dana Kollmann

Clinical Assistant Professor

Education

Ph.D., Anthropology, American University, 2007

M.A., Anthropology, American University, 2002

M.F.S., Forensic Science, George Washington University, 1994

B.S., Anthropology, Towson State University, 1990

Areas of Expertise

Forensic Archaeology

Criminal Forensics

Crime Scene Investigation

Archaeological Grave Identification and Exhumation

Physical Anthropological Analysis of Human Skeletal Remains

Forensic and Technical Photography

Biography

Dana Kollmann graduated from Towson University in 1990 with a BS degree in Anthropology. She went on to complete the MFS (Master of Forensic Science) program at George Washington University, and later earned a MA and PhD in Anthropology from American University.

Dana has 11 years of crime lab experience, ten of which was obtained through her work as a Forensic Services Technician with Baltimore County Police Department. Dana also trained as one of the Department's shoe and tire examiners. Her experience in forensic archaeology and anthropology has been obtained primarily through her training at the Smithsonian Institution. Dana has a variety of national and international experiences including mass grave exhumation and victim identification in the former Yugoslavia; analysis of Roman plague victims in Croatia; and examination of Mayan skeletal remains excavated from tombs in the Petén region of Guatemala. Dana also does archaeological consulting and is called upon to assist in the exhumation of between 3 and 6 burial sites each year. Dana also serves as an anthropologist on the National Disaster Medical System's Disaster Mortuary Operational Response Team and was most recently deployed to Haiti to assist in the identifications of Americans killed in the 2010 earthquake.

Dana's dissertation published in 2007, entitled "Life and Death in the Eastern Woodlands: A Bioarchaeological Synthesis of Seven Late Woodland Period Mortuary Sites in Maryland," reflects her combined interests in biological anthropology and archaeology. In this study, Dana compared two temporally distinct late prehistoric populations in Maryland's Upper Potomac Valley and considered the biological consequences associated with the transition to maize agriculture.

Dana is the faculty advisor for the Forensic Science Student Organization. The services of this group of students are regularly requested by law enforcement to assist in the search for human remains and associated evidence.

SCOPE OF WORK AND RESEARCH DESIGN

CENTRAL UNITED METHODIST CHURCH ARLINGTON, VIRGINIA

The following presents a revised Scope of Work (SOW) and Research Design for the Archeological Investigation of the ±.75 acre Central United Methodist Church Site located adjacent to and northwest of the intersection of Fairfax Drive (Route 237) and North Stafford Street in Arlington, Virginia; the investigation may include the possible archaeological excavation of human remains. This SOW was revised in accordance with comments by Arlington County Historic Affairs staff following a meeting held on site on July 28, 2016. All proposed research and archeological investigations will be conducted by Thunderbird Archeology, a division of Wetland Studies and Solutions, Inc., of Gainesville, Virginia. All investigations will be conducted in accordance with relevant local, state, and federal law, standards, and guidelines.

Preliminary archival research conducted online and at the Arlington County Public Library Center for Local History has indicated that the early 20th-century church was built on the historic 19th-century Robert Ball, Sr. family burying ground. In 1911, a congregation that had formed two years earlier built the first section of what was then called the Methodist Episcopal Church at 4201 North Fairfax Drive (000-7838) within the project area. On October 30, 1922, at the Circuit Court of Arlington County, Virginia, it was stated that if graves were found during the realignment of Clements Avenue (present-day Stafford Avenue), they should be reinterred within the Robert Ball, Sr. graveyard. Research regarding the Ball family, church, local cemeteries, and transportation has yet to yield new information about what occurred during and after the realignment of Clements Avenue (present-day Stafford Avenue). On November 8, 1923, the cornerstone of a new church closer to Clements Avenue was added.

Thunderbird Archeology reviewed cemetery records for direct descendants of Robert Ball, Sr., and, so far, has determined that there is potential for at least six marked (a-f) and three unmarked burials (g-i).

On November 13, 1776, Robert Ball, Sr. was born in Fairfax County, Virginia. He died May 21, 1861 and his grave marker is present on the site (a). On June 9, 1803, he married Mary Ann Thrift. She died Oct. 7, 1864 and her grave marker is present on the site (b). In 1817, Mary Ann gave birth to twins, Martha Ball and Mary Matilda Ball Reed. In 1833, Mary Matilda died. The other twin's death date is unknown. The location of their burial is unknown; therefore, there is potential for their unmarked burials at the site (g-h). In 1854, infant granddaughter, Alice Ball, was interred. This is the first known burial to occur (c). In 1855, son, William Ball, died at the age of 52. His burial location is unknown and therefore he is potentially unmarked at the site (i). In 1881, Frances E. Dyer was interred and is the last known burial (d). Robert Ball's children not buried at the site were interred at Oakwood Cemetery, Falls Church; Ball Family Cemetery, Ballston; Travers Family Cemetery, Arlington; and Congressional Cemetery, D.C.

Other marked burials at the cemetery are associated with James Thrift Ball (b. 1806, d. Mar. 6, 1867) – (e), Mary Sewell Ball (b. July 4, 1800, d. Oct. 4, 1870)–(f). Additional research will be conducted on these individuals and may identify additional possible burials associated with members of their families.

PREVIOUSLY CONDUCTED ARCHEOLOGICAL RESEARCH

Thunderbird Archeology conducted specialized archeological investigations at two specific locations within the Central United Methodist Church property in advance of geotechnical soil borings in June of 2016. No evidence of graves or grave shafts was identified at the two geotechnical soil test bore locations as result of the investigations.

PROPOSED ARCHEOLOGICAL INVESTIGATIONS

Archival Research

WSSI will conduct additional archival research focused on verifying information regarding the history of the cemetery, the completeness of the reported previous disinterment effort, and the identities of individuals potentially interred within the cemetery. Based upon the results of the archival research, WSSI will conduct genealogical research in attempt to identify next-of-kin for individuals potentially interred within the cemetery.

Ground Penetrating Radar (GPR) Investigation

Under the direction of WSSI archeology staff, GeoModel, Inc. of Leesburg, Virginia will conduct a GPR survey to locate possible graves at the site. The survey area will include all portions of the site excepting the locations of standing buildings and other major obstructions. The GPR survey will be conducted using a GSSI radar computer control unit and a 400 megahertz (MHz) transducer. The system will be hand towed across the site. The depth of investigation of the 400 MHz transducer is 6 to 8 feet in sand and less in clay soils. GPR transects will be made in perpendicular directions at appropriate interval spacing, typically 1-foot, across the survey area. The ground penetrating radar (GPR) data will be interpreted in the field. Any anomalous GPR data representing possible graves will be marked on the ground with paint or flags and survey located by WSSI using DGPS or conventional land surveying methods. The GPR survey will be documented with an illustrated report, prepared by GeoModel, Inc. and WSSI, describing the purpose, methods, and results of the work. Said report will assist in guiding the excavations detailed below and will be made available to local and state agencies and involved members of the public.

Agency Coordination and Public Notice

WSSI will coordinate and direct consultation meetings with the relevant agencies, including Arlington County and the DHR to determine the requirements for recovery of human remains at the site. In accordance with the Code of Virginia (57-38.1), WSSI will undertake active, good faith efforts to locate parties that will be interested in removal of remains from the cemetery including, at a minimum, posting notice at the site of the cemetery, and providing notice to and consultation with interested parties including, but not necessarily limited to, the Arlington Historical Society, and other local historical and genealogical societies that will be identified.

WSSI will attempt to locate next-of-kin for individuals believed to be interred at the cemetery, provide notice to said next-of-kin if identified, and consult with said individuals to obtain their consent for removal of remains from the cemetery and will publish a Public Notice for disinterment of human remains from the cemetery. Upon publication of the notice, WSSI will prepare and submit to the DHR a permit application for Archeological Removal of Human Burials. WSSI will also coordinate with the landowner and agency staff to hold and direct a public meeting.

Additionally, on behalf of the property owner, McGuireWoods LLP will seek to obtain an order from the county circuit court allowing the legal archeological removal of human remains from the site and the relocation of said remains to another cemetery (see §57-36, §57-38.1, §57-38.2, and §57-39). The requirements for public notification and coordination with the DHR under the administrative permit and court order are similar and these processes will be dovetailed to the degree possible.

All reasonable efforts will be made to ensure that involved members of the public and any involved descendants of individuals interred within the cemetery provide consent; however, even if such consent is not obtained, the above referenced court order and/or burial permit may still be obtainable on the basis of the project's public benefits and the project could proceed under such circumstances.

Archeological Investigation and Recovery of Human Remains

Investigation of Extant Grave Markers

Upon DHR issuance of the permit for Archeological Removal of Human Burials and/or issuance of the court order, WSSI will excavate the southwestern portion of the property where burials may be located (based on the location of extant grave markers) using a backhoe outfitted with a smooth bucket. All excavation will be directed and monitored by an archeologist. Said archeologist will meet the Secretary of the Interior's Professional Qualifications Standards and will have previous experience conducting excavations within historic burials. A qualified skeletal biologist will be available to assist with the excavation of human remains. It is anticipated that the skeletal biologist will be in the field during approximately 20% of the excavations. WSSI will obtain establish and maintain basic safety devices and Erosion and Sedimentation (E&S) controls.

If grave shaft features are found, WSSI will excavate within said feature using a backhoe outfitted with a smooth bucket. Excavation will continue to the top of the coffin or interment as identified by WSSI archeologists. WSSI archeologists will hand-excavate the soils from identified burial features from the top to the base of the coffin or interment and metal detect at the base and edges of each excavated burial feature in order to attempt to verify that the entirety of the burial is removed. All soils removed by manual excavation will be screened through ¼-inch hardware cloth to recover human remains and/or artifacts. At the discretion of the project archeologist, mechanically excavated soil will be shovel sorted and examined for artifacts or remains that may be present in previously disturbed contexts. Any artifacts recovered will be bagged and labeled by grave shaft number and by soil horizon. Soil strata observed at the burial will be classified according to standard pedological designations. Soil profiles will be made, with soil descriptions noted in standard soil terminology (A, Ap, B, C, etc.) and soil colors described using the Munsell Soil Color Chart designations. WSSI will backfill all excavations at the conclusion of fieldwork and distribute seed and straw across disturbed areas.

WSSI will document all fieldwork with notes, drawings (including plans and profiles), and photographs. The location of the burials will be survey-located. Skeletal remains, if found, will be carefully exposed to allow field documentation including *in situ* scaled drawings and photographs.

Any recovered human remains will be treated in accordance with their preservation (i.e. fragile remains will be stored in small plastic containers or wrapped in aluminum foil, wet remains will be wrapped in wet paper or cloth, and all remains will be placed in plastic bags marked with full provenience data). Assemblages of human remains from each burial feature will be placed within

a padded plastic transport coffin marked with provenience data. Chain of custody logs will be maintained for each container. Any recovered artifacts will be cleaned, recorded, photographed and analyzed according to all applicable federal, state and local standards and guidelines. The objectives of laboratory processing and analysis, at minimum, will be to determine to the extent possible the date and cultural affiliation of the interments. Artifact labeling with provenience information will not be conducted as recovered artifacts will be reinterred with associated remains.

WSSI will prepare a detailed illustrated report including the results of archival research and a general historical context of the cemetery, a summary review of the previously conducted cemetery investigations on the property, presentation of the methodology utilized during the excavations, a map showing the location of the cemetery as well as the locations of any excavated grave shafts, photographs of all excavations, artifacts, grave furniture, and skeletal remains, a detailed description of all excavations, artifacts, grave furniture, and skeletal remains, a report on skeletal analysis of any recovered remains, and interpretations of results and recommendations for additional archeological work that may be necessary. Said report will be submitted to the County and the DHR upon completion.

In accordance with anticipated terms of the DHR permit, any recovered human remains will be temporarily stored in a secure climate-controlled storage facility at WSSI's offices in Gainesville, Virginia and/or at the Skeletal Biology Laboratory at the Towson University in Towson, Maryland. The proposed scope for skeletal analysis is included as Appendix III. Also, in accordance with terms of the permit, remains will be ultimately reinterred by the landowner in the manner required at the required burial place. It is anticipated that remains will be reinterred at Columbia Gardens Cemetery in Arlington, Virginia.

Archeological Monitoring of Site Remainder

At the onset of site clearing/construction/ground-disturbing activities, WSSI will monitor ground disturbing activities on all previously uninvestigated portions of the property to the level where human burials may be located. All excavation/ground disturbance of soils with potential for location of human remains will be directed and monitored by WSSI archeologists. WSSI will document all fieldwork with notes, drawings (including plans and profiles), and photographs.

If grave shaft features or human remains are identified, these will be investigated, removed, and reinterred as described above.

WSSI will prepare a detailed addendum report that will be appended to the report described above for submission to the County and DHR. The final addendum report will be prepared in a manner that meets all federal, state, and local standards and guidelines.

PROPOSED BIOARCHAEOLOGICAL EXAMINATION OF HUMAN REMAINS RECOVERED FROM THE ROBERT BALL SR. FAMILY BURYING GROUND, ARLINGTON, VIRGINIA.

Proposed Project Bioarchaeologist: Dana D. Kollmann, Ph.D.

I. Introduction:

The goals of this study are to provide the following baseline information: (1) document burial receptacle (e.g., coffin shape, length, width); (2) record body position; (3) document standard in situ skeletal measurements; (4) inventory burial associations; (5) establish a minimum number of individuals; (6) record bone, joint surface, and dental inventories; (7) determine age and sex; (8) assess ancestry; (9) code and describe skeletal pathology (e.g., infection, arthritis, trauma); (10) code and describe dental pathology (e.g., caries, abscesses, periodontal disease); (11) describe taphonomy; (12) document occupational stress markers; (13) record cranial and postcranial metrics; (14) photograph standard views of the cranium, mandible, and dentition as well as unusual pathology and anomalies; (15) document non-metric traits; and (16) obtain radiographs of pathological specimens as well as subadult dentation, femora and tibiae. These goals are contingent upon bone preservation and the complete nature of each skeleton.

II. Methods:

Field investigations will include supporting WSSI staff in interpreting and recording grave data according to established protocol. Standardized forms will be used to document burial attributes, which refer to physical characteristics of the grave as well as specific positional information regarding the body. Attributes include consideration of the form of disposal (simple or compound), body preparation (e.g., shroud, clothing), articulation (degree of anatomical order of the skeletal elements), body alignment (cardinal orientation of the long axis of the grave using two directions), head placement (the end of the grave containing the head of the individual), body position (prone, supine, left or right sides), arm position (extended, flexed, semi-flexed, crossed over chest, crossed over abdomen, etc), leg position (extended, flexed, or semi-flexed), minimum number of individuals (MNI) per grave (single, double, triple interment), and details regarding the grave shaft and burial container (coffin shape, construction, lid type, measurements). In situ measurements of the body will be recorded and will include the lengths of individual long bones as well as combined limb lengths and breadths of the shoulders, elbows, pelvis, knees and ankles.

Remains that are exhumed will be transported to the Archaeology and Forensic Science Laboratory at Towson University. Using the Smithsonian Institution system of inventory, each bone (with the exception of carpals, metacarpals, most tarsals, metatarsals, and phalanges) and most joint surfaces are recorded as being either complete (66 percent or more is present) or incomplete (33 to 65 percent is present). Any bone represented by 32 percent or less is inventoried as a fragment and not included in total bone counts. The parietals, temporals, malars, maxillae, palatines, scapulae, clavicles, ribs, innominates, patellae, tali, calcanei, humeri, radii, ulnae, femora, tibiae, and fibulae and associated joint surfaces are scored according to their anatomical position (i.e., left or right side). Scapulae are considered to be complete when they

contain the glenoid cavities as well as the major portion of the bodies and complete innominates contain at least 66 percent of each primary unit (ilium, ischium and pubis). Vertebrae are inventoried as complete when at least 66 percent of the centra and neural arches are present, and for ribs to be considered complete, the head and neck must be present.

For the vertebrae, the inventory is divided among the cervical (C), thoracic (T), and lumbar (L) as follows: C1, C2, C3-6, T1-9, T10, T11, T12, and L1-5. For each single element category (e.g., C1), the bone is scored as either complete or incomplete. For a range of vertebrae (e.g., C3-6) the number present and the number of complete elements are recorded. The rib (R) inventory is conducted in a manner similar to that of the vertebrae and ribs are categorized as follows: R1, R2, R3-10, R11, and R12. A single rib is recorded as complete or incomplete, and for a range (e.g., R3-10), the total number present and the number of complete elements are recorded.

A more detailed format is used to document long bones (i.e., humeri, radii, ulnae, femora, tibiae, and fibulae). Each bone is divided into the proximal, middle, and distal third of the diaphyses. At least 66 percent of each third must be present for it to be scored as complete. Other long bone scoring options include proximal third missing only, middle third missing only, distal third missing only, proximal third present only, middle third present only, and distal third present only.

Also inventoried are the proximal and distal joint surfaces for each of the aforementioned long bones, as well as the temporomandibular joint, the acetabulae, and the auricular surfaces (or the sacro-iliac joints) of the innominates. These are scored as complete if at least 50 percent of the intact (uneroded) joint surface is present, and incomplete if less than 50 percent is present. Nothing is recorded if the joint is entirely eroded or missing.

This degree of detail in the skeletal inventory process produces accurate bone and joint surface inventories for each individual and facilitates the assessment and interpretation of the minimum number of individuals, trauma and pathology by providing baseline counts by element, side, age, and sex. These inventories can be tallied to assess the frequency of depressed cranial fractures on the frontal, for example, relative to the total number of frontals in a sample. It is also possible to examine the distribution of fractures among males and females, and by age to see if infants, children, young adults, or older adults are more susceptible to a particular type of trauma.

Dental inventories parallel bone inventories with regard to the level of detail. Each tooth is scored for presence (tooth only, tooth in socket, or partially erupted tooth) or absence (antemortem loss with socket only, antemortem loss with bone resorption, postmortem loss with socket only, unerupted, or congenital absence). Sockets are examined for periodontal and periapical abscesses as well as tooth loss that resulted from an abscess. Recent loss is distinguished from distant loss by the degree of alveolar resorption. The presence of caries on the occlusal, buccal, lingual, interproximal, and the crown enamel junction of each tooth are also documented. If present, these lesions are assigned a numeric value of 1 through 5, with 1 representing a small pit lesion and 5 indicating complete destruction of the relevant enamel crown surface. Pulp exposure is also recorded and attributed to either caries or dental attrition. Calculus is scored on a severity scale of 1 through 6 and abrasion is scored according to its

location on the crown. Alveolar resorption is measured for the permanent maxillary and mandibular molars.

For subadults and young adults, the degree of dental calcification for each deciduous and permanent tooth is documented. Coding options include cusp initial, cusps initial coalescence, cusps initial development, crown $\frac{1}{2}$, crown $\frac{2}{3}$, crown $\frac{3}{4}$, crown complete, root initial, cleft initial, root $\frac{1}{4}$, root $\frac{1}{3}$, root $\frac{1}{2}$, root $\frac{3}{4}$, root complete, apex $\frac{1}{2}$, and apex complete. Occlusal surface attrition is recorded with regard to the stage of wear as defined by Smith (1984), as well as the plane of wear.

The next step in the examination process includes the assessment of taphonomy. Taphonomic changes are documented according to the system proposed by Behrensmeyer (1978). Each skeleton is assigned a weathering stage with the range extending from 0 (unweathered bone showing no sign of cracking) to 5 (extremely weathered, friable, splintered bone retaining little to no compact cortical surfaces). Other taphonomic considerations include bone color, staining, surface and shape changes, cultural modification, adherent materials, and museum preparation or modification.

Age, sex, and ancestry are determined according to standards presented in Bass (1994), Buikstra and Ubelaker (1994), Gill and Rhine (1990), and Ubelaker (1980). Age is determined by both developmental and degenerative changes. When the age at death is less than 25 years, dental calcification, long bone growth, and epiphyseal union are the primary indicators of age. For older individuals, dental and skeletal degeneration and generalized morphological changes provide useful criteria. Adult age is assessed using principally the symphyseal regions of the pubic bones, the sternal rib endings, and the auricular surfaces of the ilia. Additional criteria include closure and subsequent obliteration of the cranial and palatal sutures, degeneration and osteophytic lipping on the joint surfaces, cortical bone density, and dental attrition and pathology.

Broad age categories are neonates or newborns under one-month of age; infants 2-11 months; children 1-4 years, 5-9 years, and 10-14 years; young adults 15-34 years; and older adults 35-plus years. The term subadult is used to refer to anyone less than 15 years of age. More specific ages are assigned whenever possible. The youngest coded age category is birth to 6 months. Due to established standards for epiphyseal union, long bone growth, and dental calcification, subadult age can be determined with a great deal of accuracy and age is assigned in one-year increments from 6 months through 19 years (Table 1). For adults, a broad age range that generally spans a 10-year interval (e.g., 35-44) is assigned, followed by a refined coded age in a 5-year increment.¹

¹ An individual assigned the broad age range of 35-44 might be assigned code 24, indicating that they most likely fall into the 35-39 age range.

Table 1. Skeletal Age Coding			
CODE	AGE	CODE	AGE
01	Birth - 6 months	19	17.5 - 18.5 years
02	6 months - 1.5 years	20	18.5 - 19.9 years
03	1.5 - 2.5 years	21	20 - 24 years
04	2.5 - 3.5 years	22	25 - 29 years
05	3.5 - 4.5 years	23	30 - 34 years
06	4.5 - 5.5 years	24	35 - 39 years
07	5.5 - 6.5 years	25	40 - 44 years
08	6.5 - 7.5 years	26	45 - 49 years
09	7.5 - 8.5 years	27	50 - 54 years
10	8.5 - 9.5 years	28	55 - 59 years
11	9.5 - 10.5 years	29	60-plus years
12	10.5 - 11.5 years		
13	11.5 - 12.5 years		
14	12.5 - 13.5 years		
15	13.5 - 14.5 years	96	Young adult (15 -34 years)
16	14.5 - 15.5 years	97	Old adult (35+ years)
17	15.5 - 16.5 years	98	Unknown subadult
18	16.5 - 17.5 years	99	Unknown adult

Sex determinations are based upon pelvic and craniofacial morphology, the development of muscle attachment sites, and sexual dimorphism in size. Pelvic morphology provides the most reliable indication of sex. Of particular importance are the shape and width of the sciatic notches, the presence or absence of preauricular sulci and parturition pits, auricular surface elevation, the width of the subpubic angle, shape and size of the obturator foramina, and the dimensions and morphology of the pubis and ischiopubic rami. Cranial indicators include the size of the skull, the robusticity of the external occipital protuberance and temporal lines, the size of the malars and mastoids, development of the supraorbital ridge and supramastoid crests, the sharpness of the supraorbital rims, and the shape of the mental eminence and gonial angle of the mandible. Juvenile skeletons are not sexed, as there are no standards in place to perform this task accurately or reliably.

Principal features for determining ancestry include facial height, orbital shape, interorbital breadth, development and prominence of the nasal bones, width and shape of the nasal aperture, morphology of the inferior nasal margin, shape of the palate, maxillary alveolar prognathism, facial profile, and discrete traits of the dentition including cusp patterns on the occlusal surfaces of the molars and the presence of shovel-shaped incisors. The shape of the femora is also considered, especially with regard to anterior-posterior flattening (platymeria) and torsion of the proximal end.

Each bone and joint surface are examined for evidence of pathology, which may include conditions that result in bone loss (e.g., resorptive lytic lesions, bowing caused by rickets or disease, porosis, and osteopenia/osteoporosis), bone formation (i.e., radiographic findings of increased density/sclerosis, periostitis, osteomyelitis with medullary involvement, neoplasms, ossified cartilage, and ossified connective tissue such as ectopic bone, enthesopathy, myositis ossificans), and bone loss and formation. Other recorded pathological conditions include degenerative joint disease (e.g., osteophyte formation, porosis, bony ankylosis, and eburnation) Schmorl's depressions, spinal and sacral anomalies (e.g., spina bifida and spondylolysis), syphilis, tuberculosis, porotic hyperostosis, cribra orbitalia, osteoporosis, and evidence of trauma or dislocations (luxation or subluxation). For most conditions, the severity (mild, moderate, or severe), state (active or healed), degree of involvement (localized or widespread), and specific area affected with regard to the involved element are documented.

Bone fractures are scored according to their precise location on the element, severity (incomplete or complete), and state (no healing, healing, or healed). For cranial fractures, the shape of the defect (blunt/round, blunt/ovoidal, edged, crushing, and projectile entry or exit), the presence of radiating fractures, the severity (affected ectocranium and/or endocranium), maximum and minimum diameter of the defect, and the number of blows are recorded. Scoring options for long bone fractures include perimortem breaks, periostitis/callus formation, osteomyelitis, or pseudoarthrosis. Vertebral body fractures are recorded as compression fractures, single endplate depression breaks with or without wedging, single end-plate depression breaks, congenital/idiopathic wedged breaks, and biconcave breaks. Cranial and postcranial measurements are recorded for complete elements according to the standards outlined in Buikstra and Ubelaker (1994).

Cranial and postcranial measurements are recorded for complete elements according to the

standards outlined in Buikstra and Ubelaker (1994). Radiographs of the femora and tibiae are obtained for subadults and young adults with intact elements. Additional radiographs are occasionally necessary to more closely examine bones displaying trauma or pathology and to assess the extent of dental calcification when teeth cannot be easily removed from the alveolus.

Each skeleton is documented in a narrative format with an emphasis placed upon the skeletal inventory and taphonomy; determinations of age, sex, and ancestry; skeletal anomalies and functional morphological alterations; and skeletal and dental pathology. Representative photographs are taken of the crania, occlusal surfaces of the dentition, pathology, trauma, and anomalies.

Not included in this study are DNA analyses, stable isotope analyses, digitization of intact crania or bone density (DEXA) scans.

III. References:

Bass, W. M.

1994 *Human Osteology: A Laboratory and Field Manual*. Missouri Archaeological Society, Inc., Special Publication Number 2. Columbia, MO: Missouri Archaeological Society, Inc.

Behrensmeyer, A. K.

1978 Taphonomic and Ecologic Information from Bone Weathering. *Paleobiology* 4: 150-162.

Buikstra, J. E. and D. H. Ubelaker, eds.

1994 *Standards for Data Collection from Human Skeletal Remains: Proceedings of a Seminar at the Field Museum of Natural History*. Research Series Number 44. Fayetteville, AR: Arkansas Archeological Survey Press.

Gill, G. W., and S. Rhine, eds.

1990 *Skeletal Attribution of Race*. Maxwell Museum of Anthropology, Anthropological Papers Number 4. Albuquerque, NM: Maxwell Museum of Anthropology.

Ubleaker, D. H.

1980 *Human Skeletal Remains: Excavation, Analysis, Interpretation*. Manuals on Archeology, Number 2. Washington, DC: Taraxacum Press.