Cemetery Preservation Technology Workshop

June 21 – 23, 2018
Helena, Montana
Welcome to Helena! Thank you for joining the History Foundation for this special workshop. We all know that preservation projects take a village of passionate volunteers. This is especially true in Montana’s cemeteries. Local researchers and community members have dedicated themselves for many years, but much preservation work remains to be done. This workshop will help bridge the gap between centuries of buried history and new technologies and methods that are history-in-the-making. Our hope is that every attendee leaves this workshop with new resources for preservation projects. I appreciate all of the work our speakers, staff and volunteers have done to make this workshop possible. Now, get ready for three full days of education and demonstrations!

Charlene Porsild
President & CEO, The Montana History Foundation

Filming During the Workshop

Spokane-based, North by Northwest Digital Productions will be capturing footage throughout the workshop to create a cemetery preservation training video.

This free training video will be available to the public Fall 2018.

Look for it on www.mthistory.org.

Thank You to The National Center for Preservation Technology and Training, an office of the National Park Service.

This workshop was made possible by a Preservation Technology and Training grant to The Montana History Foundation.
Schedule at a Glance

DAY I, Thursday, June 21 | Radisson Colonial Hotel, Helena

8:15-9:00  Registration
9:00-Noon Welcome & Morning Presentations
Noon-1:30 Lunch Keynote
1:30-4:30 Afternoon Presentations
5:00-6:30 Reception and Networking
*Dinner on your own*

DAY II, Friday, June 22 | Forestvale Cemetery, Helena

8:30-11:45 Orientation & Morning Demonstrations
11:45-12:30 Lunch
12:30-4:00 Afternoon Demonstrations
* Dinner on your own
7:30-8:30 Historic Helena Ghost Walk

DAY III, Saturday, June 23 | Field Trips, Meet at Radisson

8:30-4:00 Elkhorn Ghost Town
9:00-Noon Helena’s Historic Cemeteries
9:00-Noon Behind the Scenes with After-Life Professionals
1:30-4:00 East Helena Cemetery

---

Thank You to The National Center for Preservation Technology and Training, an office of the National Park Service. This workshop was made possible by a Preservation Technology and Training grant to The Montana History Foundation.
### Thursday, June 21

Radisson Colonial Hotel, 2301 Colonial Drive, Helena, MT  
Sessions in Executive Room, Meals in Legislative/Judicial Rooms

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15–9:00</td>
<td>Registration</td>
</tr>
<tr>
<td>9:00–9:15</td>
<td><strong>Welcome</strong></td>
</tr>
<tr>
<td></td>
<td>Wilmot Collins, Mayor of Helena</td>
</tr>
<tr>
<td>9:15–10:15</td>
<td><strong>Preservation Technology and Montana’s Historic Cemeteries</strong></td>
</tr>
<tr>
<td></td>
<td>Ellen Baumler, Interpretive Historian, Montana Historical Society: “Montana’s Cemeteries: Where History and Preservation Technology Meet”</td>
</tr>
<tr>
<td>10:15–10:30</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>10:30–Noon</td>
<td><strong>Technology for Preservation I</strong></td>
</tr>
</tbody>
</table>
|               | Tim Urbaniak, Professor (Emeritus) of Drafting & Design Technology, Montana State University/TRU Technologies: “Applying RTI and Photogrammetry in Montana’s Historic Cemeteries”  
|               | John W. Olson, Archaeologist/GIS Specialist, The Extreme History Project: “GPS, GIS and ARCGIS: The Case of the Nevada City Cemetery”  
<p>|               | Ethan Ryan, Archaeologist/GPR Specialist, University of Montana: “GPR and Subsurface Analysis: Beneath the Surface of Montana Cemeteries” |
| Noon–1:30     | <strong>Lunch Keynote</strong>                                                    |
|               | Adela Morris, President and CEO, Institute for Canine Forensics: “Bone Sniffing Dogs, the Search for Amelia Earhart, and other Stories” |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:30–3:15</td>
<td><strong>Contemporary Problems in Historic Cemeteries</strong>&lt;br&gt;A panel of after-life professionals, including:&lt;br&gt;Debra Crider, Sexton of Forestvale Cemetery;&lt;br&gt;Bill Alley, Sexton of Deep Creek Cemetery in Townsend; and representatives from Memorial Monuments and Anderson Stevenson Wilke Funeral Home</td>
</tr>
<tr>
<td>3:15–3:30</td>
<td><strong>Break</strong></td>
</tr>
<tr>
<td>3:30–4:30</td>
<td><strong>Technology for Preservation III</strong>&lt;br&gt;Kirsten Green, Visiting Assistant Professor, University of Montana: “Forensic and Mortuary Archaeology”&lt;br&gt;&lt;br&gt;John Grebenkemper, Historic Human Remains Detection Canine Handler, Institute for Canine Forensics: “Forensic Dogs for Cemetery Preservation”</td>
</tr>
<tr>
<td>5:00–6:30</td>
<td><strong>Reception and Networking</strong>&lt;br&gt;Sponsored by NorthWestern Energy&lt;br&gt;Dinner on your own</td>
</tr>
</tbody>
</table>
Historic Helena Ghost Walk – Meet at Lewis & Clark Library, 120 S. Last Chance Gulch
Join historian and author Dr. Ellen Baumler for a walking tour highlighting some of historic Helena’s most haunted sites. Tour begins and ends in front of the Lewis and Clark Public Library. Transportation on your own.

Demonstration Group Rotation Schedule

GROUP A

8:30–8:50  Orientation  Debbie Crider & Charlene Porsild

9:00–9:45  Canine Forensics  Adela Morris & John Grebenkemper

10:00–10:45  GPS & GIS  John Olson & Crystal Alegria

11:00–11:45  GPR  Ethan Ryan

11:45–12:30  Lunch

12:30–1:00  Drone Demo  James Strait

1:15–2:00  Cemetery Botany  John Daniel Harris

2:15–3:00  Stone Repair  John Rummel

3:15–4:00  RTI and Photogrammetry  Tim Urbaniak

7:30–8:30  Historic Helena Ghost Walk – Meet at Lewis & Clark Library, 120 S. Last Chance Gulch

GROUP B

8:30–8:50  Orientation  Debbie Crider & Charlene Porsild

9:00–9:45  GPS & GIS  John Olson & Crystal Alegria

10:00–10:45  Canine Forensics  Adela Morris & John Grebenkemper

11:00–11:45  Cemetery Botany  John Daniel Harris

11:45–12:30  Lunch

12:30–1:00  Drone Demo  James Strait

1:15–2:00  GPR  Ethan Ryan

2:15–3:00  RTI and Photogrammetry  Tim Urbaniak

3:15–4:00  Stone Repair  John Rummel

Transportation to Forestvale Cemetery will be on your own. Driving instructions are included in your registration packet. To carpool, please meet in the Radisson Colonial Hotel lobby by 8:00 am Friday morning, demonstrations will start promptly at 8:30 am. Food and water will be provided. Please dress for the weather.
Saturday, June 23

Radisson Colonial Hotel, 2301 Colonial Drive, Helena, MT

The motor coach and vans will leave from and return to the hotel parking lot

Pre-registration was required for all field trips. Questions/Changes? Stop by the registration table on Thursday.

8:30-4:00  Elkhorn Ghost Town
The group will receive hands-on training and observe the canine forensic team working in new territory. This is a working field trip, please come prepared to help out and get dirty. Sack lunch provided. Transport provided by passenger van. Primitive bathroom facilities.

9:00-Noon  Helena’s Historic Cemeteries
Ellen Baumler will lead the group on an interpretive tour of some of Helena’s most beautiful and well-preserved cemeteries, including Resurrection, Home of Peace, County Poor Farm, Benton Avenue and more. Transport provided by motorcoach, bathroom on board.

9:00-Noon  Behind the Scenes with After-Life Professionals
Join funeral director Brianne Mulvaney for an in-depth examination of the modern funeral process. We will tour the Anderson Stevenson Wilke Funeral Home, Memorial Monuments (a headstone and burial vault workshop), the Lewis & Clark County Coroner’s Office, and the historic Retz Funeral Home (est. 1926). Transport provided by passenger van.

1:30-4:00  East Helena Cemetery
Join archaeologist and ground penetrating radar specialist, Ethan Ryan for an afternoon of hands-on experience locating unmarked graves and mapping the East Helena Cemetery. This is a working field trip, please come prepared to help out. Transportation on your own, primitive bathroom facilities.
Speaker Biographies

**Adela Morris, President and CEO, Institute for Canine Forensics (ICF)**
Adela Morris has been active in human remains detection with her dogs since 1986 and has deployed her dogs on hundreds of searches specializing in cold cases, crime scenes and historic and prehistoric burials. She is an instructor and evaluator for Human Remains Detection dogs. Adela is the founder and director of the Institute for Canine Forensics (ICF), a nonprofit organization that specializes in locating historic and prehistoric burials. She’s also the founder of the Canine Specialized Search Team, a volunteer resource for the Santa Clara County (CA) Sheriff’s Office. Jasper is her 6th certified detection dog and Jett, her 16 month old puppy, is currently working on his ICF historical human remains certification.

**Charlene Porsild, President & CEO, The Montana History Foundation**
Charlene Porsild, a native of Canada’s Yukon, is an author and historian with a passion for the mountain west. An avid trail user, Charlene enjoys hiking with her sweet pups, Cinnamon and Jack. When not hustling for history, find Charlene exploring Montana’s many ghost towns and historic cemeteries with her family.

**Crystal Alegria, Co-Director and MT Project Archaeology Coordinator, The Extreme History Project**
Crystal B. Alegria has worked in the field of heritage outreach and education for the past sixteen years with an emphasis on community history, curriculum development, and archaeological site stewardship. Crystal is the co-director and co-founder of The Extreme History Project, a nonprofit based in Bozeman, MT that brings history to the public. She is also the Montana coordinator for Project Archaeology, a national heritage education program based at Montana State University. Crystal was the president of the Montana Archaeological Society and currently serves on the Bozeman Historic Preservation Advisory Board and the Bozeman Preservation Advocacy Group. She has a B.S. in Anthropology and a M.A. in History from Montana State University.

**Ellen Baumler, Interpretive Historian, Montana Historical Society**
Ellen Baumler earned her Ph.D. in English, Classics and History from the University of Kansas. She has been the interpretive historian and National Register sign program coordinator at the Montana Historical Society since 1992. Ellen is a longtime member of the Humanities Montana Speakers Bureau, a 2011 recipient of the Governor’s Award for the Humanities, and co-curator of the Society’s recent award-winning Chinese exhibit, “Forgotten Pioneers.” The author of many books and articles, Ellen’s current project is a book on mortuary customs and cemeteries in Montana. She has also authored National Register nominations including those for Helena’s Home of Peace and Benton Avenue cemeteries.
Ethan Ryan, Archaeologist/GPR Specialist, University of Montana

Ethan Ryan is currently in the Ph.D. program for Anthropology/Archaeology at the University of Montana. He has been the ground penetrating radar specialist for iResponse, LLC., an affiliate of the Chippewa Cree Cultural Resource Office of Rocky Boy’s Reservation since Feb 2017. Ethan previously worked for the Bureau of Land Management and has worked on large-scale research projects in Alaska, British Columbia, Montana, and Wyoming. Ethan’s specialties in addition to GPR include GIS, lithic analysis, and spatial analysis. In his free time, he enjoys fly-fishing, hiking, and playing music in two Missoula-based bands.

James Straight, Tribal and Cultural Resource Officer, Montana Department of Environmental Quality

James Strait is the tribal and cultural resources officer, as well as the unmanned aerial systems (UAS) manager for the Montana Department of Environmental Quality. James holds a B.S. in Anthropology from Iowa State University and a M.A. in Archaeology, specializing in the Northern Plains and stone tool analysis from the University of Arkansas. James has worked in the private sector doing cultural resource management throughout the Midwest, Southeast, and Southwest, but his primary focus in archaeology has been in Montana, Wyoming and the Dakotas. Since joining DEQ in 2009, James has worked for the facility siting program. The UAS program within DEQ was started by James in 2012, and has become an invaluable toolset for many of the programs within DEQ such as small miner exploration, remediation and abandoned mine lands.
**John Grebenkemper, Historic Human Remains Detection Canine Handler, ICF**

John Grebenkemper joined the Institute for Canine Forensics in 2007 after retiring from computer design. His dog, Kayle, is a certified Historic Human Remains Detection dog. He and Kayle have traveled extensively to various archaeological projects to locate burial locations. The oldest burial they have found has been dated as 9,000 years old. This past summer they traveled to the South Pacific on a National Geographic project to look for the remains of Amelia Earhart. The material found on that expedition is currently under analysis to extract the degraded DNA. Before joining ICF, John spent 40 years working in the fields of physics and engineering research. He received a PhD from Stanford University, has published more than 20 technical papers, and received 8 U.S. patents.

**John S. Harris, University of Montana**

How might surface vegetation divulge the past story of a place to archaeologists? How do archaeologists know what to look for in site vegetation? These overlooked questions preoccupied John Harris’ master’s thesis, “The Sylvan Blindspot.” He holds a M.A. in Anthropology from the University of Montana, where as a Ph.D. student, he investigates the vegetal signatures of past human activities at historic log cabins and cemetery sites in Western Montana. His research interests include landscape archaeology, historical archaeology, historical ecology, and historical ethnobotany.

**John W. Olson, Archaeologist/GIS Specialist, The Extreme History Project**

John W. Olson graduated Montana State University in May 2016 with a Bachelor of Science in Anthropology, focus on Archaeology, and a minor in Geographic Information Sciences (GIS). He has volunteered and worked for The Extreme History Project since 2013, and leads historic tours in downtown Bozeman. He is the GPS/GIS project coordinator for the Nevada City Cemetery GPS Mapping Project since March 2015 and has been part of the project to create the cemetery database. While working as the store manager and buyer for the Museum of the Rockies in Bozeman, MT, he is investigating options and opportunities for pursuing a master’s degree in archaeology and furthering his education in GIS.

**John and Daren Rummel, Montana Granite Craftsmen**

Montana Granite is a locally owned and operated family business, providing almost a hundred years of experience to Montana families. The Rummel family and Montana Granite have a long-established history in the Helena community, dating back to 1930 when John Rummel opened the first shop on Montana Avenue after working with John Kain at the Kain Granite Company. Sixteen years later, the family built the current monument shop on Forestvale Road and then in 1958, expanded to Great Falls. Montana Granite Company of Helena changed hands in 1971 when Ken Ludtke and his family purchased it. They serviced Helena until the early 2000’s when they sold it back to the Rummels who are now the fourth generation of Montana Granite monument makers and craftsmen.
Kirsten Green, Visiting Assistant Professor, University of Montana

Kirsten received her B.S. in Anthropology from Southern Methodist University in 2006, then received her M.A. in Forensic Anthropology from the University of Montana in 2008. She received her Ph.D. in Physical Anthropology from the University of Montana in 2016 with research on stable isotope analysis of burials from a Maya site in Belize. Between her masters and PhD programs, she worked for several Customer Relationship Management (CRM) companies in California before landing a job at the State of California as an associate environmental planner. She is currently a visiting assistant professor at the University of Montana in the Anthropology Department. Kirsten teaches osteology, Forensic & mortuary archaeology, introduction to physical anthropology, and a seminar in bioarchaeology. Kirsten also consults with the State Medical Examiner’s Office on forensic cases for the State of Montana. She continues her work in Belize each summer excavating, documenting, and cataloging burials for several sites in the Belize River Valley.

Riley Auge, Curator of Anthropological Collections Facility, University of Montana

Riley Auge, Ph.D., RPA, holds a M.A. in Folklore and Mythology and a Ph.D. in Anthropology/Archaeology. She has spent 17 years researching the material manifestations of traditional belief systems of various cultural and ethnic groups. She recently received the Society for Historical Archaeology’s Kathleen Kirk Gilmore Award for her dissertation Silent Sentinels: Archaeology, Magic, and the Gendered Control of Domestic Boundaries in New England, 1620–1725, which will be published this fall. She has published articles in national and international journals on the material culture of ritual and magic, presented at national and international conferences on the subject, and teaches classes and workshops on ritual, religion, and magic. Her research projects include the cemeteries of Virginia and Nevada City, MT. She is currently a curator for the University of Montana’s Anthropological Collections Facility and teaches in the University of Montana anthropology department.

Tim Urbaniak, Professor (Emeritus) of Drafting and Design Technology, Montana State University, TRU Technologies, LLC

For 20 years, Dr. Timothy Urbaniak led projects that explored archaeology and history through applications of technology. As the past director of the Montana State University Billings Archaeological Field Team, he has led students and volunteers in projects and field schools that have included rock art and historic inscription surveys, 3D reconstructions of historic sites, digital imaging applications, surveying technologies, desktop virtual reality, three-dimensional scanning and applications of multimedia. In 2014, he completed his Ph.D. in Anthropology at the University of Montana where he studied historic inscriptions and their role as a form of residual cultural communication. He is now retired emeritus from teaching following his 29th year at Montana State University in the Drafting and Design Program and currently manages TRU Technologies LLC, a company specializing in applying technologies to archaeological and anthropological research. His research work exploring and documenting historic inscriptions continues.
The Radisson Colonial Hotel Helena is a proud sponsor of The Montana History Foundation Cemetery Workshop

Radisson Colonial Hotel Helena– 2301 Colonial Drive
Helena, MT 59601
406-443-2100
WWW.RADISSON.COM/HELENAMT
Canine Forensics or Historic Human Remains Detection Dogs: A relatively new method using trained dogs to identify and situate areas of human burial. It has been effectively used to delineate boundaries and extent of burial sites to 1,000 years old. It is a highly effective technology for mountainous cemeteries where it is difficult to bring in other equipment and/or where burials have been disrupted by erosion, making GPR and other methods ineffective.

Genealogy: The study of families, their lineages, and their history. Genealogists track the descent of a person, family, or group from an ancestor or ancestors. Genealogists use oral interviews, historical records (cemetery records, birth/death/marriage records, newspaper obituaries), genetic analysis, and other records to obtain information about a family and to demonstrate lineage and relationships between individuals and groups.

GIS – Geographic Information System: Using existing maps and additional information, GIS can assist communities in creating a cemetery map system so that they can better track burials, sell burials, and plan for future cemetery management. GIS can also be used to create layers of historical information, searchable at an individual level or used to create mobile-friendly walking or driving tours, etc. GIS can integrate data from all of the methods into a compact package. GPS, photogrammetry, GPR and other data can all be georeferenced in GIS to produce highly complex results.

GPR – Ground Penetrating Radar: A geophysical method that uses radar pulses to capture images of the subsurface of the ground. This technique uses electromagnetic radiation in the microwave band (UHF/VHF frequencies) to detect the reflected signals from subsurface structures. The radar detects below-ground disturbances, such as coffins, vaults, water lines, and other human-made disturbances. The sites can then be marked (often first with surface spray paint), then the location coordinates can be mapped and identified.

GPS – Global Positioning Systems: Used by many communities to locate and map burials. GPS, of course, is widely available and relatively inexpensive, making its use more widespread. Data collected through GPS locating can identify all burial sites and stones within a given cemetery and is often used in conjunction with GIS (see above). Spatial data from GPS can then be used to create extensive site maps locating burials and linking these sites to additional data such as headstone information.

Historical Research and Documentation: Despite the significant assistance technology can bring to the preservation efforts in a cemetery, we cannot discount the obvious importance of documentary research and documentation. Local history sources can be combined with online databases like Chronicling America, Montananewspapers.org, Find A Grave, and Ancestry.com.
LiDAR – Light Detection and Ranging: A remote sensing method that uses light (as a rapidly pulsed laser) to measure variable distances from the earth. It can be mounted on a drone for aerial views or on a tripod on the ground. Pulses from the laser are used to produce highly accurate data about characteristics of the earth’s surface (like grave sites), which are represented as a three-dimensional point cloud. Capable of millimeter-level accuracy, LiDAR data can be imported into civil, modeling, and architectural software for further inquiry and processing.

Magnetrometry: A geophysical method that uses magnetic sensors to measure magnetic field strength. Archaeologists have used this method to detect previously unknown burial locations since burials often include metal/iron caskets, casket handles, and other materials. It can also measure disturbance since changes in the soil from digging holes or creating a fire can change the magnetic properties or signature of the soil. Because the sensors detect the presence of metal (particularly iron), the readings can often be adversely affected by fencing and other sources of metal.

Photogrammetry: This method takes measurements from photographs, especially to recover the exact positions of surface points. This technique has been successful in documenting rock art by taking multiple views of the subject and “sewing” the images together with software, using exact measurement points to build a three dimensional model. Often this construct will allow researchers to read a previously illegible inscription or better view faded or faint markings.

RTI – Reflectance Transformation Imaging: A method that uses digital cameras and a controlled array of light sources to capture the surface shapes and colors of monuments. It enables interactive re-lighting from any direction through software. The digital images can then be mathematically enhanced to potentially reveal surface shape, color, texture, and other attributes. The resulting construct often allows the researcher to see/view a previously indecipherable inscription or image. Highly useful for headstone or monument inscriptions that are otherwise illegible.

Soil Resistance: This method of grave site detection passes a small electrical current through the soil, and measures its resistance. Resistance is increased by less-conductive obstructions or soil and the resistance is decreased by more conductive soils such as those with slightly higher water content. In this method, probes can be used to detect a coffin as well. The “Werner Array” method puts all four probes on a linear arrangement to a depth of approximately 1 meter, while a “dipole” arrangement can detect to about 3 meters below surface. This technique is very time consuming, but is relatively inexpensive compared to GPR or magnetrometry.
Save the Date

MONTANA
Antiques Appraisal Fair

Saturday, September 22
Fort Benton Agricultural Complex
1205 20th Street, Fort Benton

Start dusting off your heirlooms for our Antiques Appraisal Fair on September 22. Do you have a treasure hiding in plain sight? Bring it to our expert appraisers to find out.

The views and conclusions contained in this document are those of the Montana History Foundation and should not be interpreted as representing the opinions or policies of the U.S. Government. Mention of trade names or commercial products does not constitute their endorsement by the U.S. Government. This program was developed under a grant from the National Center for Preservation Technology and Training, a unit of the National Park Service. Its contents are solely the responsibility of the Montana History Foundation and do not necessarily represent the official position or policies of the National Park Service or the National Center for Preservation Technology and Training.
Thank You to our Workshop Sponsors

North Western Energy

Radisson
COLONIAL HOTEL HELENA

Anderson Stevenson Wilke
Funeral Home & Crematory

Opportunity Bank
OF MONTANA

us bank

First Interstate Bank
Member FDIC. Equal Housing Lender.

NCPTT

DOTY
MONTANA GRANITE INDUSTRIES
GREAT FALLS • HELENA

NATIONAL PARK SERVICE

www.mthistory.org