



2021 Secretary of Defense

Environmental Awards

Cultural Resources Management, Individual/Team

Mr. Thomas Edward Penders

Introduction

Mr. Thomas Edward Penders is the Cultural Resources Manager (CRM) for the 45th Space Wing (45 SW) that “Sets the Pace for Space.” He supports mission-related activities at Cape Canaveral Air Force Station (CCAFS), Patrick Air Force Base (AFB), Malabar Transmitter Annex (MTA), and the Jonathan Dickinson Missile Tracking Annex (JDMTA). These installations cover 19,241 acres and represent the most significant aspects of the US space program’s history and future. Mr. Penders preserves and protects history while moving toward new and exciting space programs on the same properties.



Mr. Thomas Penders

Mr. Penders is the Cultural Resources Manager for the 45th Space Wing. In this capacity, he oversees cultural resources at Cape Canaveral AFS, Patrick AFB, MTA and JDMTA.

Background

As 45 SW CRM and Archaeologist since 2006, Mr. Penders conducts archaeological surveys, historic properties surveys, and construction monitoring at Cape Canaveral AFS, Patrick AFB, MTA, and JDMTA, as well as writing the subsequent reports submitted to the Florida State Historic Preservation Office (SHPO) per Section 106 of the National Historic Preservation Act (NHPA) and Archaeological Resources Protection Act (ARPA). Mr. Penders is the manager for over 500 cultural resources, including prehistoric and historical archaeological sites, missile sites, launch complexes, the Man in Space National Historic Landmark (NHL) District, World War II resources, cemeteries, a lighthouse, and historic missiles. He regularly conducts consultations with federally recognized tribes regarding traditional cultural properties and repatriation issues. Mr. Penders is significantly involved in all National Environmental Protection Act (NEPA) planning activities, consultations, and documentation. He consistently works five years ahead of the proposed construction projects to always resolve issues so cultural issues do not delay project designs or construction.

Summary of Accomplishments

Mr. Penders leverages his many years of experience and regional expertise to conduct most of the wing's cultural resource surveys in-house. In the past two years, he led six archaeological surveys, saving 45 SW an estimated \$480,000. His surveys paved the way for the utilization of lands for the development of critical defense and launch programs identified in the 45 SW General Plan while complying with ARPA and NHPA.

Mr. Penders was the first to obtain approval from the Florida SHPO for laser scanning as an improved technique for Historic American Building Survey/Historic American

Engineering Record (HABS/HAER) recordation. To maximize available funds and efficiently comply with the NHPA, Mr. Penders initiated a six-year program to conduct high definition (HD) three-dimensional (3D) laser scanning of six NHL launch complexes as well as launch-related facilities slated for demolition or reuse. The scanning surveys are the most advanced technology available to preserve history and saved USAF \$80,000 per launch complex compared to the traditional HABS/HAER. These projects also track deterioration of the facilities to enable engineers to better stabilize them.

Overall Cultural Resources Management

Mr. Penders is continuously exploring alternative approaches to enhance the quality and timeliness of the wing Cultural Resource Management program in meeting the short- and long-term objectives of the installation while saving USAF money. Mr. Penders developed and wrote the 45 SW Integrated Cultural Resources Management Plan (ICRMP) himself and conducted all annual reviews. In 2020, he completed the 5-year ICRMP update himself, saving \$85,000 in contract costs.

Tom has stayed closely connected to local universities through papers published and support for local community projects. Through these connections, he developed and leverages a partnership with local universities to meet fiscal challenges and time constraints for USAF project completion. The Department of Anthropology, University of Central Florida (UCF) exchanges student work with the 45 SW on archaeological surveys, excavations, cemetery documentation, and artifact analysis, which has saved USAF approximately \$300,000 per year. The university and students are glad to have interesting archaeological work so close to home. Often students have to travel abroad for this type of work. This initiative, named the Cape Canaveral Archaeological Mitigation Project (CCAMP),

is a 10-year plan to assess and report on NRHP eligible archaeological sites.



Excavation Techniques

Mr. Penders in the excavation unit showing student proper techniques.

The information gathered will inform greater CCAFS/45 SW efforts to plan for climate change and sea-level rise impact to sites in the next 20 years.

Every project involving historic facilities is reviewed and monitored per the requirements of NEPA and the NHPA by Mr. Penders. He has conducted surveys and expedited consultations with the SHPO, Tribal Historic Preservation Officers (THPOs), and the National Park Service (NPS) for the reuse of historic launch complexes and related facilities for commercial and other DoD launch customers (United Launch Alliance, US Navy, SpaceX, Relativity, Space Florida, Firefly Aerospace and Blue Origin).

Cultural Resources Compliance

The 45 SW lands contain hundreds of NRHP eligible and listed historic properties, a NHL district, and archaeological sites affiliated with three federally recognized tribes. Some sites, such as Launch Complex 11 and 36 and the Cape Canaveral Lighthouse, have multiple concerns that require interaction with the NPS, SHPO, the Advisory Council on Historic Preservation (ACHP), and federally recognized

tribal governments. Mr. Penders maintains ongoing dialogues with all these stakeholders during the Section 106 process.

Mr. Penders built and maintains relationships with the Florida Historical Society, Brevard County Historical Commission, which enables access to archives and historical documents that result in better coordination on consultation packages. The sharing of information is beneficial to all.

Mr. Penders assisted with a beneficial agreement between Cape Canaveral Lighthouse Foundation (CCLF) and the 45 SW that improves public visibility via limited tours. The public enjoys wing cultural resources at no cost to USAF. This program averages 1,000 visitors a year and ensures USAF complies with the public access requirements of the DoD instruction for cultural resources. Mr. Penders serves the board of the CCLF as an advisor, assisting them with the development of plans for the lighthouse campus and assisting with NHPA, Native American Graves Protection and Repatriation Act (NAGPRA), and ARPA consultations since the lighthouse sits on a multi-component archaeological site containing pre-contact Native American human remains.

Historic Buildings and Structures

Mr. Penders works closely with base engineers and launch partners to promote the reuse of historic facilities and to ensure appropriate rehabilitation, maintenance, and repair per the *Secretary of the Interior's Standards*. He works with project proponents and regulators to find common ground for these undertakings that keep the historic character intact while using modern, cost-effective materials. He assesses facilities for eligibility for listing in the NRHP (if not evaluated), such as Hangar S. The National Aeronautics and Space Administration (NASA) had received permission to demolish Hangar S., but Mr.

Penders saw an opportunity for a commercial space customer, Blue Origin, to utilize the hangar. The 45 SW took over the hangar from NASA, saving the hangar from being demolished. Mr. Penders is currently working closely with Blue Origin to renovate and restore the hangar per the *Secretary of the Interior's Standards*.

Archaeological Resources

During the award period, Mr. Penders conducted or oversaw archaeological surveys on Cape Canaveral AFS, MTA, Patrick AFB, and JDMTA, totaling 3,975 acres. Approximately half of this acreage will require no further action regarding NRHP eligible sites. These parcels are now cleared for future use, and sites have been identified for avoidance as needed.

Native American Program

The Native American Program achieved a new high in tribal relations by organizing repatriation activities of Native Americans at Cape Canaveral AFS.



Burial Mounds

Mr. Penders created a Native American Graves Protection and Repatriation Act repatriation mound (foreground) in order not to disturb prehistoric burial and scattered human remains known to be at this site.

Additional reburials will continue as the tribes recover more remains from various museums across the US. His work with the tribes was

above and beyond the requirements under NAGPRA and improved relations with the federally recognized tribes. He works closely with the tribes and is trusted by them to conduct reburials. Since these sites on USAF property are already sacred sites with human remains, adding more remains does not add any additional constraints.

Curation

Mr. Penders continues to obtain no-cost curation services through the National Park Service (NPS) at Canaveral National Seashore via a memorandum of agreement (MOA) for the past five years. This ensures USAF complies with 36 CFR Part 79 and is a \$6,000.00 annual savings. Over 300 artifacts have been properly curated during the award period, and space is available for more. Mr. Penders conducts inspections of the building regularly to ensure the collections maintain 36 CFR 79 standards.



3D Scan – 2,000 Year Old Ground Stone Plummet

2,000 year old ground stone plummet found on CCAFS.

Per the terms of the MOA, researchers and the public are not allowed access to the curation facility. However, Mr. Penders maintains a database of the collection, which is available to anyone interested in conducting research on the materials. Artifacts are also available for viewing by the public at outreach events.

Given the issue of limited space for curation and the issue of museums running out of space,

Mr. Penders is working with USF to create an online virtual curation facility. All artifacts in the 45 SW collections will be 3D laser scanned. These images and data on the artifacts will be retained in an online “museum.” These images can be used by anyone conducting research, can be used for educational purposes, and will alleviate the need for a physical curation facility.

Cultural Resources Awareness and Education (On and Off Nominee Property)

Mr. Penders has institutionalized public education and outreach as a significant aspect of the job of the 45 SW CRM. In the past two years, Mr. Penders has participated in the annual meetings of the Florida Anthropological Society and the Southeastern Archaeological Conference. These presentations have focused on aerospace archaeology, general public education on the history of Cape Canaveral AFS, and more technical aspects for professional archaeologists.

The 45 SW is responsible for eight historic cemeteries at Cape Canaveral AFS that have suffered from years of neglect. Mr. Penders took the initiative to develop a program in-house, which dramatically improved the eight

cemeteries. He undertook a multi-disciplined approach to mitigate the adverse effect of demolition by neglect and complied with the NHPA regulations. Mr. Penders undertook a project to improve and stabilize the cemeteries that included marking unmarked graves with permanent grave markers, replaced fences, and repaired broken markers.

His efforts resulted in the cost savings to USAF of \$100,000.00. The project also had a positive impact on the public. During the annual Descendants Day event, families of those buried in the cemeteries visit them and expressed appreciation for the tremendous improvements.

There was the potential for unmarked graves outside the existing eight cemetery fences placed in the 1960sr. Penders initiated a project that combined ground-penetrating radar, photogrammetry, and HD 3D laser scanning. The recently completed project provides comprehensive maps of the cemeteries that will be used in support of the long term CCAFS development plan.

Another initiative by Mr. Penders is working with the CCLF on their program to reconstruct



Before and After Image of Graver Marker

Before and after image of grave of Harold W. Butler. Before image (left) shows the grave before cleaning with D-2. The after image (right) shows the dramatic effects of proper cleaning techniques.

the keepers' cottages and associated buildings at the lighthouse site. The Foundation and Mr. Penders have worked together to create accurate reconstructions of two buildings, with two more slated for construction in the next two years. Mr. Penders has advised the Foundation on placement to avoid disturbing archaeological deposits, and Native American remains on the site. He consulted with the Foundation on developing museum displays and informational signage and was instrumental in upgrades at the site, which provide enhanced public education during weekly tours.

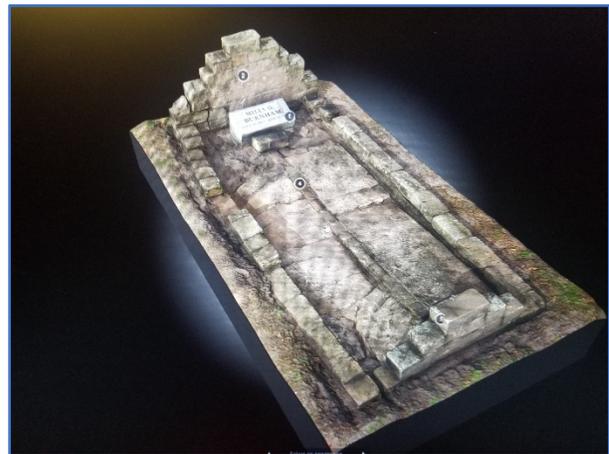
Community Relations

Mr. Penders has deep roots in the community when it comes to cultural resources. He is the founder of Archaeologists for Autism (AFA). The mission of AFA is to unlock the potential of children with developmental disabilities. This is an annual event where children with autism spectrum disorders and their families have a chance to experience archaeology in a fun environment. Most of these children would not be able to experience archaeology without this event. Mr. Penders is supported by 45 SW military and civilian personnel and the base museum (Air Force Space and Missile Museum) in this effort. In the past two years, over 185 families have attended the event from all over Florida and three nearby states.

Mr. Penders maintains affiliations with the Eastern States Archaeological Federation, Florida Anthropological Society, Society for American Archaeology, Society for Historical Archaeology, and the Southeastern Archaeological Conference. He was the past president of the Indian River Anthropological Society, and has served as an advisor to the North Brevard Heritage Foundation, and continues to serve on the Cape Canaveral Lighthouse Foundation as an advisor. Mr. Pender's affiliations keep him involved with

the community and spark partnerships for CCAFS.

Through the partnership with the University of South Florida (USF) and their HD 3D laser scanning projects, USF students are receiving classroom and field training on the use and applications of this new technology. Students are responsible for creating educational posters, which are on display at 45 SW. The data has also been shared on YouTube and social media, where the general public can take "fly through rides" of the NHL complexes without leaving their chair. An educational mini-documentary based on this work was created in 2019.



3-D Scan of a Grave

Very precise 3-Dimensional scanned image of Lighthouse Keeper, Mills O. Burnham's grave.

Considering the base is a secured facility, the ultimate goal of all the data is to allow the general public to experience the history of the launch complexes. It will enable the general public to take virtual tours of these historical sites. Data from the project was also provided to the National Archives and Records Management in Washington, DC.

Mr. Penders developed a relationship with the Underwater Archaeology Department of the Florida Bureau of Archaeological Research (BAR) on maritime survey off the coast of

Cape Canaveral AFS. He worked to identify rocket and missile crash sites found during the survey. In 2016, a sixteenth-century shipwreck was found 300 ft. off the beach of Cape Canaveral AFS. In 2018, it was confirmed to be the flagship of French explorer Jean Ribault, which sailed to establish a colony in Florida in 1562 and 1565. The ship, named *La Trinité*, is considered one of the most significant shipwrecks in Florida history and has significant implications for the history of Cape Canaveral AFS. Mr. Penders has been instrumental in clearing the work of the BAR with Range Safety and security to facilitate access to the wreck from land on Cape Canaveral AFS.

Mr. Penders has used his position to enhance USAF's reputation by allowing the general public an unprecedented look into the history and prehistory of 45 SW lands and has made community involvement a top priority by linking it with other goals of the ICRMP and the mission objectives. It also demonstrates that the DOD is a good steward of the past and its commitment to protecting our national cultural assets.

Mission Enhancement

Mr. Penders assisted commercial launch partners with the identification and implementation of launch site reuse. The 45 SW's mission is to support commercial space missions. Mr. Penders conducted archaeological and historic properties surveys and fast-tracked consultation with the regulators to ensure the partners and USAF met timeline milestones without delays. The reuse of Launch Complexes 11 and 36 and the lands surrounding them by a commercial launch entity created a unique set of problems. The two complexes are associated with the early space program, and the lands surrounding them contain previously recorded archaeological sites. Confounding the issues, the boundaries of the sites were inaccurate, and the sites

themselves were never properly surveyed. The launch complexes, as well as the historic and prehistoric archaeological sites, required consultations to adequately address any current or future impacts. Also, only preliminary development plans were available. The consultations required addressing current issues with a consideration of potential development within the lease area. Before working for the 45 SW, Mr. Penders worked for launch contractors at Kennedy Space Center and Cape Canaveral AFS. He used his knowledge of launch operations to address possible future needs by Blue Origin within their lease area. The launch site reuse was accomplished within a very tight schedule to meet development milestones. This was also accomplished for the reuse of Launch Complex 13 by SpaceX, Launch Complexes 15 and 16 by Relativity, and Launch Complex 20 by Firefly Aerospace, which all faced similar issues.