

**Session Track:** Panel Discussion  
**Session Code:** CS12

**Paper:** Interdisciplinary Investigations at Pointe du Hoc, Normandy, France

**Presented by**

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**Speaker(s) Biography**

Dr. Tanya Wattenburg Komasa holds a Ph.D. in Architecture from Texas A&M University, an MS in Historic Preservation from Columbia University, New York, a BS in Landscape Architecture from the University of California, Davis, and a Certificate in Historic Preservation from Texas A&M University. Dr. Komasa is on the faculty of the Concrete Industry Management program at CSU, Chico, and is a Corresponding Fellow of the Center for Heritage Conservation, College of Architecture, Texas A&M University. Dr. Komasa has extensive experience in building design and preservation, directs academic and professional research in concrete repair and preservation, and has developed computer graphic methodologies for use in many areas of the building professions.

Dr. Richard Burt is an Associate Professor and Undergraduate Coordinator in the Department of Construction Science at Texas A&M University. Trained as a Building Surveyor in the United Kingdom he is a member of the Royal Institution of Chartered Surveyors. Dr. Burt's research interests in historic preservation are in the area of historic building documentation and construction history. A faculty fellow of the Center for Heritage Conservation at Texas A&M, he is a principal investigator on the survey and documentation of the historic D-Day site at Pointe-du-Hoc in Normandy, France and has worked on several Historic American Building Surveys.

Robert Warden Bio to follow

Mark Everett Bio to follow (4th presenter not included in three spaces above, Texas A&M University)

**Abstract**

The proposed panel presentation fits particularly well with the 2008 conference theme of Interdisciplinary Collaboration in Heritage Conservation as it combines the four discipline areas from two different universities including geotechnical, geophysical, and historical teams from Texas A&M University (A&M) and a historic concrete team from California State University, Chico (CSU Chico). Under the leadership of A&M, the teams worked together to document and evaluate the site and structures at Pointe-du-Hoc, Normandy, France.

Pointe-du-Hoc is one of the most culturally important historic sites of the 1944 World War II Normandy invasion. Early in the morning of June 6, 1944, Lt. Col. James Earl Rudder led elements of the 2nd Ranger Battalion in one of the most famous and heroic actions of D-Day. Their mission was to destroy munitions capable of firing on troops and ships landing on Utah and Omaha beaches.

Pointe-du-Hoc is a medium coastal battery consisting of a variety of structures including gun emplacements, casemates, personnel and ammunition bunkers, and the prominent Observation Post. Constructed as part of Hitler's Atlantic Wall campaign, the site was designated a class A Historic Site by the French Government on 28 February 1955. The site was formally transferred to the American Battle Monuments Commission (ABMC), an independent agency of the Executive Branch of the federal government, for perpetual care and maintenance on January 11, 1979, and remains a monument to those who sacrificed there.

The building that best represents the tragic events of D-day is the Observation Bunker. From its perch on the northern most position on the point, this building represents the strength of the German resolve to block out the world and the American resolve to penetrate its barrier. The symbolic power of the Observation Bunker was embraced and enlarged in 1979 when a memorial to the rangers was placed on top of its domed observation room. The memorial pylon is flanked by two granite tablets that tell the ranger story of D-day.

For most tourists the memorial and the Observation Bunker are the most significant objects of Pointe-du-Hoc. In 2001 the Observation Bunker, with its close proximity to the cliff edge, was closed to tourists because of concerns emanating from various collapses of the cliffs. This decision separated the most symbolic elements of the site from the public, but more importantly it created a debate over what, if anything should or could be done, to save the signature building and its Ranger Memorial from falling victim to a future cliff collapse.

The debate is complex because of the fusion of scientific questions with historical, international, and national significance. From these considerations ABMC issued a call for a two-part study of Pointe-du-Hoc consisting of a study of the failure mechanisms of the cliffs with suggested remediation and a survey of the important historical features on site. The Center for Heritage Conservation (CHC) at A&M was chosen to perform this study with the concrete researchers from CSU, Chico, being brought in mid-project. The work was carried out independently but overall project conclusions were created collaboratively. The project operations emanated from 15 Action Items:

- Action 1: Study the case history
- Action 2: Resistivity Tomography
- Action 3: Soil-Borings
- Action 4: Lab Testing
- Action 5: Deliverables for Determination of Failure Mechanisms
- Action 6: 3D Laser Scan of cliffs from Observation Bunker to boundaries of resistivity tomography measurements.
- Action 7: Acquire WWII aerial photographs of Pointe du Hoc.
- Action 8: Identify cliff condition prior to bombing and construction and develop a cliff degradation map based on bombing and shelling
- Action 9: Complete drawings and 3D model of the Observation Bunker
- Action 10: Exterior laser scans of Observation Bunker
- Action 11: Recording of small building north of Observation Bunker.
- Action 13: Resistivity of Observation Bunker
- Action 15: Benchmark Placement and Tilt Meter Monitoring
- Action 16: Document and identify existing bunkers
- Action 17: Document and identify site features

Concrete investigations were added to the project as questions arose regarding the configuration of inaccessible areas of the concrete structures and concerns emerged regarding the quality of the concrete materials. These investigations included laboratory testing of limited samples from the site at Construction Technology Labs in Chicago under the direction of researchers from CSU, Chico. These tests included determining the mix proportions and compressive strengths of the concrete and composition of the cement including petrographic examination, cement content, compressive strength, and X-ray fluorescence. Concrete fieldwork was also performed using affordable state-of-the-art Non-Destructive Testing (NDT) equipment that will be publically available this year. The NDT equipment enabled further documentation of the configuration and condition of the concrete. These tests helped determine foundation depths, differences in the quality of the concrete between different structures and construction phases, how the quality of concrete affected the amount of damage sustained during Allied bombing, and the current conditions of the structures in terms of concrete strength, chloride penetration, reinforcing deterioration and cover, and general environmental deterioration.

The panel will consist of the following presenters:

1. Dr. Tanya Komar Historic concrete

2. Dr. Richard Burt - Photogrammetry and reconstruction of the exploded ammunition bunker and historic site features
3. Dr. Mark Everett - Resistivity, tracing of ground water and subsurface voids
4. Robert Warden - Laser scanning and visualization of all data from different disciplines<sup>7</sup>