BEFORE THERE WAS A NATION,
THERE WAS THE ARMY

PROGRAM COMMENT FOR ARMY WARFIGHTING READINESS AND ASSOCIATED INFRASTRUCTURE

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1.0. Introduction.

1.1. Authority. Section 106 of the National Historic Preservation Act, 54 U.S.C. 306108 (Section 106 and NHPA), requires Federal agencies to consider the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment with regard to such undertakings. The ACHP has issued regulations that set forth the process through which Federal agencies comply with their statutory responsibilities. Those regulations are codified under 36 CFR Part 800 (Section 106 regulations).

A Section 106 undertaking is defined in 36 CFR § 800.16 as a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval. Under 36 CFR § 800.14(e), Federal agencies can request the ACHP provide a "program comment" on a "category of undertakings" and, once provided, the agency operates under the program comment "in lieu of" conducting individual reviews of such undertakings under 36 CFR §§ 800.3 to 800.7. The category of undertakings addressed under this program comment is Department of the Army (Army) warfighting readiness activities and management actions on associated infrastructure proposed to take place on Army installations across the country.

A Federal agency can meet its Section 106 responsibilities by following the process set forth in an applicable program comment. The Army developed and requested the ACHP provide this Program Comment for Army Warfighting Readiness and Associated Infrastructure to better support Army warfighting readiness.

1.2. Rationale. The Army's warfighting readiness mission is defined by Title 10 U.S. Code § 7062. This program comment directly supports the statutory military readiness mission. It accelerates and improves Section 106 compliance for Army warfighting readiness and associated infrastructure by reducing bureaucracy, optimizing resources, and using defined standards and procedures to ensure predictable outcomes. It is an at scale solution that enables Army-wide warfighting readiness while balancing NHPA Section 106 historic preservation requirements.

Program comments operate on two key principles: 1) they apply to a category of undertakings that in this case are warfighting readiness activities and management actions on associated infrastructure; and 2) they operate in lieu of 36 CFR § 800.3 - 800.7, meaning program comment procedures replace the project-by-project review procedures in the regulation. A benefit of program comments is that they allow a federal agency to comply with Section 106 in a tailored, consistent way for an agency-wide category of undertakings rather than addressing each undertaking individually through project-by-project review. Program comments enable a federal

agency's headquarters to establish a broader, more holistic agency-wide approach to Section 106 compliance than is possible at the local level.[1]

The Army has 250 years of experience designing, building, operating, and maintaining military infrastructure. Since its origins as the Continental Army in 1775, the Army has designed and constructed an enormous portfolio of real property assets. The Army has a sprawling infrastructure of 14 million acres and 135 installations with over 390,000 buildings and structures exceeding one billion square feet, designed, built, and managed by the Army for warfighting readiness purposes. Since 1866, the Army's construction of buildings has relied on standardized Army-wide plans and designs, resulting in nearly identical historic building types and installation designs nationwide,[2] which are subject to many recurring management actions. Program comments are designed for federal agencies like the Army, that have repetitive management actions affecting a large inventory of similar types of historic properties and for agencies with programs that generate many similar undertakings.[3]

The Army currently manages over 200,000 properties subject to Section 106 review (122,000 buildings and structures and 84,000 archeological sites). With the Army's large and aging inventory of buildings and new archeological sites continually being discovered, the number of Army properties subject to Section 106 review is projected to exceed 500,000 in the near future. This situation is compounded by a complex and inconsistent regulatory environment driven by 115 different Army installation-level Section 106 compliance agreements with State Historic Preservation Offices (SHPOs), the ACHP, and others. Under these agreements, project-by-project reviews occur for actions having no adverse effects, standardized Army-wide property types are treated inconsistently across states and installations, and military infrastructure is often required to meet highly restrictive, high cost museum-level historic preservation standards that impact the economic viability of projects.[4] A recent ACHP Chairman's report titled *Report and Recommendations on the Application of Federal Historic Preservation Standards* documents the inconsistent application of overly restrictive historic preservation standards and similar economic impacts.[5]

This program comment provides a strategic, at scale Army-wide solution to its Section 106 compliance challenge. It provides the Army with a standardized framework ensuring that appropriate preservation standards are applied consistently across all Army installations. This is a proven strategy for the Army's built infrastructure. The same approach has been successfully implemented under four other ACHP-approved program comments covering the Army's 30,000

[1] ACHP Program Comment guidance - https://www.achp.gov/program_comment_questions_and_answers.
[2] Context Study of the United States Army Quartermaster General Standardized Plans 1866-1942. US Army Corps of Engineers, Seattle District, 1997; A Study of United States Army Family Housing Standardized Plans, Volumes 1-5, Beth Grashof, Georgia Institute of Technology, 1986; National Historic Context for Department of Defense Installations, 1790-1940, Volumes 1-4. Referenced studies are at https://www.denix.osd.mil/army-pchh/.
[3] ACHP Program Comment guidance - https://www.achp.gov/program_comment_questions_and_answers.
[4] For examples see *Supplemental Information Briefing* at https://www.denix.osd.mil/army-pcwr/.
[5] Report and Recommendations on the Application and Interpretation of Federal Historic Preservation Standards. Sara C. Bronin, Chairman ACHP, March 1, 2024. https://www.achp.gov/standardsreport.

historic homes, providing a clear proof of concept for Army built infrastructure.[6] This program comment recognizes that historic Army housing and associated built infrastructure were planned and developed in a coordinated manner during the same time periods. Under this program comment, they are now treated in the same consistent manner for Section 106 compliance purposes.

This program comment details the specific category of Army undertakings, specifies their likely effects on historic properties, and outlines the steps the Army takes to ensure those effects are considered. Critically, all substantive on-the-ground Army historic preservation activities continue under this program comment. The Army continues its historic preservation efforts including historic property inventory, evaluation, assessment, and treatment activities but through a standardized system that aligns with the nature of the Army's historic property portfolio and Army mission requirements. This program comment approach allows the Army to manage its vast portfolio of historic properties more effectively while ensuring it can adapt its infrastructure to meet modern defense challenges and execute warfighting readiness activities at mission speed.

1.3. Overview. This program comment implements the *military landscape* as the nationwide analytical framework for management of Army historic properties. The military landscape is composed of two primary components - *built infrastructure* and *natural infrastructure* - collectively termed *associated infrastructure*. The military landscape framework supports more consistent and context sensitive decision making on all Army installations. This program comment implements this approach through a tiered system that aligns with the Army's historic property portfolio:

Tier 1 - National Historic Landmarks (NHLs): The Army's 20 NHLs are subject to a higher standard of care if they are directly and adversely affected by an undertaking. For actions that may adversely affect NHLs, Army Secretariat-level project-by-project consultation with the ACHP and National Park Service (NPS) occurs to minimize harm and inform mitigation measures.

Tier 2 - Properties of Traditional Religious and Cultural Importance (PTRCI): Tier 2 properties are subject to higher standard of care. Proactive and project-by-project consultations are conducted by installations with Federally recognized Tribes and Native Hawaiian Organizations (NHOs) for actions to identify, evaluate, and treat PTRCI.

Tier 3 - Pre-1941 Built Infrastructure (Non-NHL) / Archeological Sites and Districts (Non-PTRCI): Program comment procedures and guidelines are implemented internally by installations in coordination with Army commands for actions affecting non-NHL pre-1941 built infrastructure and non-PTRCI archeological sites and districts.

[6] See the four program comments for historic Army housing at https://www.denix.osd.mil/army-cr/army-dod-comments/. For additional details including annual reports for the program comments for Pre-1919 housing, Inter-War era housing (1919-1940) and Vietnam War Era housing (1963-1975) see: https://www.denix.osd.mil/army-pre1919-pchh/, https://www.denix.osd.mil/army-pchh/, https://www.denix.osd.mil/army-vwehh-pc/.

Tier 4 - WWII and Cold War Era Built Infrastructure (1941-1989) (Non-NHL): Adverse effects from the covered undertakings to Tier 4 properties have been addressed by extensive mitigative documentation and by the physical preservation of period NHL properties.

2.0. Program Comment Goal, Category of Undertakings, and Effect.

2.1. Goal. The goal of this program comment is to obtain programmatic compliance with Section 106 for the Army's warfighting readiness activities and management actions on associated infrastructure on Army installations by means of this program alternative under 36 CFR § 800.14(e). This program comment establishes nationwide consistency and accelerates Section 106 compliance for Army warfighting readiness activities and associated infrastructure.

2.2. Category of Undertakings. The category of undertakings addressed by this program comment is Army warfighting readiness activities and management actions on associated infrastructure on Army installations. The warfighting readiness category of undertakings are detailed in Appendix A. Associated infrastructure is detailed in Appendix B, management actions that may affect associated infrastructure are also detailed in Appendix B.

2.3. Effect. The category of undertakings addressed by this program comment may adversely affect historic properties through ground disturbing activities and by management actions occurring on associated infrastructure. Adverse effects will be avoided whenever possible, and where avoidance may not be possible, adverse effects will be resolved through minimization and mitigative measures in accordance with this program comment.

3.0. Program Comment Operating Principles.

This program comment applies a tiered historic property management system that tailors management to the nature of the Army's historic property portfolio.

This program comment recognizes that Army installations in their entirety may be considered bounded, defined military landscapes. Military landscapes serve as the nationwide analytical framework for management of Army historic properties.

This program comment recognizes that the Army's historical use of standardized construction plans has resulted in nearly identical historic building types and installation designs nationwide, which are subject to recurring management actions.

This program comment recognizes the historical and developmental connection between Army housing and other built infrastructure on installations. ACHP approved program comment guidelines applicable to the Army's pre-1941 historic housing will be applied to the Army's pre-1941 built infrastructure (see Appendices C and D) via the terms of this program comment.

This program comment recognizes that Army installations, through consultation with Federally recognized Tribes and NHOs, will consider Indigenous Knowledge and the significance that Federally recognized Tribes and NHOs ascribe to PTRCI.

This program comment does not affect or in any way alter the Army's responsibilities under applicable Treaties, the Native American Graves Protection and Repatriation Act, American Indian Religious Freedom Act, or Executive Order 13007 Indian Sacred Sites, or any requirements other than those of the NHPA.

This program comment is supported by comprehensive documentation of World War II and Cold War era (1941-1989) historic properties prepared by the Army and Department of War.[7]

This program comment recognizes that the comprehensive documentation of World War II and the Cold War era historic properties and the physical preservation of Army World War II and the Cold War NHLs constitutes mitigation addressing the adverse effects of warfighting readiness activities and management actions on non-NHL historic properties from the WWII and Cold War eras (1941-1989).

The Army will apply the Secretary of the Interior's Standards for Rehabilitation to pre-1941 buildings through the procedures and guidelines of this program comment. The Army will utilize substitute building materials when historic building materials and in-kind building materials are not economically or technically feasible. The Army intends that most substitute building materials will be reversible and can be replaced with in-kind building materials at any time.

As specified below, this program comment recognizes the inherent danger and unlikely prospect of identifying intact historic properties safely in areas on Army installations where there are human health and safety hazards including areas containing unexploded ordnance (UXO) such as impact areas and surface danger zones, and any contaminated land areas and contaminated properties.

This program comment identifies National Mitigation Areas that preserve a broad range of historic property types and recognizes the Army's statement that National Mitigation Areas are an enduring compensatory mitigation for adverse effects to historic properties.

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[7] The Department of War Cold War Historic Properties Bibliography at https://www.denix.osd.mil/army-pcwr/ is a 244-page annotated bibliography that contains 590 individual reports that document historic properties from the Cold War era for the Army and the Department of War. Also see: National Historic Context for Department of Defense Installations, 1790-1940, Volumes I-4. DoD Legacy Resource Management Program Project 92-0075 (1995); Military Training Lands Historic Context, USACERL, 2010; World War II Temporary Military Buildings, USACERL Technical Report CRC-93/01,1993; World War II and the U.S. Army Mobilization Program: A History of 700 and 800 Series Cantonment Program, Legacy Resources Management Program, USACERL; Army Ammunition Production During the Cold War (1946-1989) , US Army Environmental Command, 2009; Army Ammunition and Explosives Storage in the United States: 1775-1945, US Army Corps of Engineers, 2000; Unaccompanied Personnel Housing During the Cold War 1946-1989, US Army Environmental Center, 2003; Historic Context for DoD Facilities WWII permanent Construction, US Army Corps of Engineers, Baltimore District, 1997; Historic Context for DoD Facilities World War II Permanent Construction, US Army Corps of Engineers, Baltimore District, 1997; California Historic Military Buildings and Structures Inventory, US Army Corps of Engineers, Sacramento District, 2000; A Historic Context for the African American Military Experience, USACERL, 1998; Army historic contexts at https://aec.army.mil/Conservation/Cultural-Resource-Technical-Documents/.

4.0. Implementation of the Program Comment.

4.1. The Military Landscape. This program comment implements the *military landscape* as the nationwide analytical framework for managing historic properties in the context of the Army's warfighting readiness activities. Installation military landscapes are a unique and dynamic nationwide asset; they are the only landscapes in the U.S. that have historically been and continue to be actively shaped by military warfighting readiness missions and activities.

Unlike static historic military sites such as battlefields or military memorials, installation military landscapes are the living, evolving manifestation of the Army's past and present warfighting readiness activities. Each Army installation in its entirety is a military landscape characterized by the following defining features:

- A landscape defined by restricted access, controlled entry/exit points, and defined borders.
- Warfighting readiness activities are the fundamental factor influencing the landscape and associated infrastructure development.
- The siting and layout of installations directly relates to the evolution of the military mission over time.
- A high degree of similarity in basic military components, standardized building designs and overall layout within and between installations.
- Pre-military historic properties embedded within the military landscape.

The military landscape is composed of two primary components - *built infrastructure* and *natural infrastructure* - collectively termed *associated infrastructure*. Built infrastructure includes the buildings and structures under Army Real Property Category Codes 1-8. Natural infrastructure is under Army Real Property Category Code 9 and incorporates all Army installation lands (see Appendices A and B).

The military landscape analytical framework recognizes that each Army installation is a continuously evolving military landscape. Army military landscapes are defined by ongoing infrastructure change and modification in response to the changing demands of the Army's warfighting readiness mission. Changes in military doctrine, training methods, and weapons technology trigger a constant process of adaptation, including new construction, demolition, reuse, and the physical expansion and contraction of installations. The military landscape is a cohesive and dynamic setting, continually shaped and defined by the military readiness mission.

Recognizing the dynamic nature of warfighting readiness activities and their role in creating and maintaining the installation military landscape is fundamental for historic property management in this setting. Installation military landscapes are created and maintained by the continuous execution of warfighting readiness activities. Warfighting readiness activity-related physical changes to the setting of historic properties and visual, atmospheric, and audible elements related to warfighting readiness activities are features of the military landscape that may contribute to the significance of historic properties within that setting.

The installation military landscape is also where warfighting readiness activities and the management of pre-military historic properties intersect. Pre-military historic properties have their own intrinsic non-military significance. Some of those properties, such as archaeological sites and PTRCI, may have significance that predates military use and may continue to have significance independent of military use. The military landscape contextualizes management of such pre-military historic properties. Pre-military historic properties located within the military landscape setting require a dual management approach by installations that addresses both their intrinsic historic significance, and their place within the operational military landscape setting.

4.2. Historic Property Management Procedures.

4.2.1. General. For warfighting readiness activities and management actions on associated infrastructure on Army installations, the identification, evaluation, assessment of effect, monitoring, and mitigation of adverse effects to historic properties may occur under the procedures in this program comment in lieu of individual project-by-project reviews under 36 CFR § 800.3 - 800.7.

The Army will define the area of potential effects of covered undertakings and will identify historic properties within the area of potential effects. The Army will evaluate identified properties for eligibility for inclusion in the National Register of Historic Places under the applicable National Register criteria. The Army will assess the effects of covered undertakings on historic properties and identify appropriate treatment measures where there are adverse effects. Due to the passage of time, changing perceptions of significance, or incomplete prior evaluations, reevaluation may be needed for properties previously determined eligible or ineligible for inclusion in the National Register of Historic Places. For certain covered undertakings, the review process will occur internally within the Army and as described below, with identified exceptions where outside consultation will occur.

4.2.2. Professional Standards and Qualifications. The Army will conduct all work on historic properties in accordance with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation.[8] This work will be supervised by individuals meeting the applicable Secretary of the Interior's Professional Qualification Standards.[9] Installations satisfy the supervision requirement either by using their own qualified staff, or by securing support through a contract or other service agreement with a firm or organization having qualified personnel that supervise the work on historic properties.

For all covered undertakings, any efforts pertaining to identification, evaluation and mitigation of PTRCI will be conducted in consultation with the appropriate Federally recognized Tribes or NHOs to ensure those efforts are informed by Indigenous Knowledge.

4.2.3. Management of Tier 1 Properties - Army NHLs. NHLs are Tier 1 properties under this program comment. NHLs are designated by the Secretary of the Interior under the authority of the Historic Sites Act of 1935. The Army will treat NHLs with a higher standard of care that

[8] Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines. 48 FR 44716. Department of the Interior, National Park Service. September 29, 1983.
[9] ibid.

includes planning to minimize harm to NHLs when they may be adversely affected by a covered undertaking. The Army Federal Preservation Officer (FPO) will conduct project-by-project consultation with the ACHP and NPS when NHLs may be directly and adversely affected by an undertaking.

There are 20 designated NHLs located on Army installations, including both individual NHL properties and NHL districts. The Army's NHLs were constructed by the Army and continue to serve the Army's national defense mission.[10]

- Ladd Field NHL District, Fort Wainwright, AK
- Fort Huachuca NHL District, Fort Huachuca, AZ
- Pioneer Deep Space Station, Fort Irwin, CA[11]
- National War College, Fort McNair, DC
- Yuchi Town Archeological Site, Fort Benning, GA
- Palm Circle NHL District, Fort Shafter, HI
- Wheeler Field NHL District, Schofield Barracks, HI
- Fort Des Moines NHL District, Des Moines, IA (Army is only responsible for specific contributing buildings)
- Rock Island Arsenal NHL District, Rock Island Arsenal, IL
- Fort Leavenworth NHL District, Fort Leavenworth, KS
- Launch Complex 33, White Sands Missile Range, NM
- Trinity Site, White Sands Missile Range, NM
- Watervliet Arsenal NHL District, Watervliet Arsenal, NY
- West Point NHL District, US Military Academy, West Point, NY
- Fort Sill NHL District, Fort Sill, OK
- Carlisle Indian School NHL District, Carlisle Barracks, PA
- Fort Douglas NHL District, Salt Lake City, UT (transfer out of Army ownership is currently underway and once completed this will no longer be an Army NHL)
- Fort Myer NHL District, Fort Myer, VA, and
- Quarters 1, Fort Myer, VA.
- Opana Radar Site, Kahuku Training Area, HI

NHPA Section 306107 "Planning and actions to minimize harm to National Historic Landmarks" states that prior to the approval of any undertaking that may directly and adversely affect an NHL, federal agencies will to the maximum extent possible undertake planning and actions as may be necessary to minimize harm to the landmark. The Federal agency also affords the ACHP a reasonable opportunity to comment regarding the adverse effect undertaking. Further, 36 CFR 800.10 requires the agency to notify the Secretary of the Interior / NPS and invite them to participate in consultation where there may be an adverse effect.

[10] Army housing NHLs are addressed under the Army's program comments historic housing and are not subject to this program comment.

[11] The Pioneer Deep Space Station, Fort Irwin, CA is managed by National Aeronautics and Space Administration under their NHPA Section 106 PA for that property and is not subject to this program comment.

The Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs (63 FR 20496) provide agencies with implementing guidelines for NHPA Section 306107. Per the Secretary's Guideline at 4(k) pertaining to NHLs, when alternatives to avoid an adverse effect to NHLs appear to require undue cost or compromise the undertaking's goals and objectives, the agency will balance those goals and objectives with the intent of Section 306107 of the NHPA.

Army installations seek to avoid adverse effects to NHLs to the maximum extent possible. Where adverse effects to NHLs are unavoidable, installations and commands prepare and submit a treatment plan for the adversely effected NHL through their chain of command to the Army FPO. The NHL treatment plan will indicate why the adverse effect is unavoidable and identify the appropriate mitigation measure identified in this program comment to minimize harm to the NHL.

The Army FPO will notify and invite the ACHP and NPS to participate in a thirty (30) calendar day consultation to address adverse effects to NHLs. The Army FPO will consider written comments from the ACHP and NPS and may require installations and commands to revise NHL treatment plans in consideration of the views provided by the ACHP and NPS. Prior to taking any action that adversely affects an NHL, the command and installation will receive the FPO's written endorsement of the NHL treatment plan. The Army FPO will make the approved treatment plan available to the ACHP and NPS for informational purposes.

4.2.4. Management of Tier 2 Properties - Properties of Traditional Religious and Cultural Importance. The relationship between the Army and Federally recognized Tribes is a government-to-government relationship founded on the principle of tribal sovereignty. This unique relationship between Federally recognized Tribes and the Army transcends the requirements of the NHPA. The Army also has respectful consultative relationships with NHOs. Through these relationships, the Army will address the significance that Tribes and NHOs attribute to PTRCI.

Indigenous Knowledge is a unique and valuable form of expertise not held by the Army, ACHP, NPS, SHPOs, or anyone other than Indian Tribes and NHOs. Indigenous Knowledge is essential for the identification and management of PTRCI. The Army will seek and incorporate Indigenous Knowledge from Federally recognized Tribes and NHOs when identifying and considering the effects of its actions on PTRCI. Installations will assess how actions under this program comment may affect such properties, considering the cultural values and beliefs associated with those properties.

PTRCI are Tier 2 properties subject to a higher standard of care. Prior to planning covered undertakings, installations will proactively consult with Federally recognized Tribes and NHOs to identify locations of PTRCI on Army installations for the purposes of avoiding adverse effects to such properties. Installations may, subject to the availability of funds, reimburse travel expenses for members of Federally recognized Tribes and NHOs when consulting and seeking such Indigenous Knowledge regarding PTRCI. Archeological sites and other properties associated with Federally recognized Tribes or NHOs are presumptively treated as potential

PTRCI, subject to further consultation with the respective Tribes or NHOs. The Army will avoid adverse effects to PTRCI to the maximum extent possible.

If a proposed warfighting readiness activity may have an unavoidable adverse effect on a PTRCI, installations will engage in a sixty (60) day consultation period with the affected Federally recognized Tribes or NHOs to inform the development of a treatment plan with appropriate mitigation measures. The recommendations provided by the Federally recognized Tribes or NHOs will be a primary consideration in preparing the treatment plan. If the recommended mitigation is not technically or financially feasible, the installation will work with the affected Federally recognized Tribes or NHOs to develop a feasible or an alternative mitigation measure.

Following the sixty day consultation period, the Army may proceed with the undertaking in a manner that allows for the completion of the mitigation measures outlined in the approved treatment plan. Army installations may afford additional time for Federally recognized Tribes or NHOs to provide their views on the proposed mitigation if there are significant extenuating circumstances and there are no major impacts to the timing and cost of the undertaking.

The confidentiality of any sensitive site information, Indigenous Knowledge, and other culturally sensitive information provided by Federally recognized Tribes and NHOs should be protected. Reports prepared for PTRCI will protect the confidentiality of sensitive information to the maximum extent possible under applicable authorities. Reports addressing the mitigation of PTRCI will be provided to the Federally recognized Tribes or NHOs that attach significance to those properties.

4.2.5. Management of Tier 3 Properties - Non-NHL Pre-1941 Built Infrastructure and Non-PTRCI Archeological Sites and Archeological Districts. This program comment recognizes that the Army possesses the equivalent professional expertise and access to information as SHPOs, NPS, and ACHP regarding pre-1941 built infrastructure and non-PTRCI archeological sites and districts. Covered undertakings on Tier 3 properties will be managed by installations in coordination with their command. Identification, evaluation, and mitigation of such historic properties will be conducted by installations in accordance with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. The Army will ensure these activities occur under the supervision of individuals that meet the Secretary of the Interior’s Professional Qualification Standards. When such historic properties may be adversely affected, installations will implement the applicable standard mitigation measure set forth in this program comment. Such activities for Tier 3 properties are reported by installations in their annual report prepared in accordance with section 7.

4.2.6. Management of Tier 4 Properties - Built Infrastructure from WWII and Cold War Eras (1941-1989) (Properties Constructed in 1941 Through and Including 1989). Non-NHL built infrastructure from WWII and Cold War eras (1941-1989) are Tier 4 properties. Adverse effects from the covered undertakings to Tier 4 properties have been mitigated by existing extensive mitigative documentation and by the physical preservation of period NHL properties. The Army’s Section 106 compliance for representative historic properties constructed during WWII and the Cold War eras has been addressed under the following nationwide programmatic compliance actions: Programmatic Memorandum of Agreement (PMOA) for DOD World War II

Temporary Buildings, Program Comment for WWII and Cold War Era Army Ammunition Production Facilities, Program Comment for Department of Defense WWII and Cold War Era Ammunition Storage Facilities, Program Comment for Department of Defense Cold War Era Unaccompanied Personnel Housing (UPH).[12] Documentation of these representative WWII and Cold War era properties exists in the extensive studies prepared for those Section 106 compliance agreements. Nearly 600 additional Army and DoD Cold War era studies are listed in the annotated bibliography at https://www.denix.osd.mil/army-pcwr/, representing comprehensive documentation of Cold War era military historic properties.

In addition to this extensive documentation of WWII and Cold War era historic properties, the Army preserves and manages four NHLs from the WWII and Cold War eras. Those WWII and Cold War era NHLs are Ladd Field NHL District, Fort Wainwright, AK; Launch Complex 33, White Sands Missile Range, NM; The Trinity Site, White Sands Missile Range, NM; and the Opana Radar Site, Kahuku Training Area, HI:

- Ladd Field NHL 1939-1947 period encompasses the establishment of Ladd Field as a critical base for Lend-Lease operations with the Soviet Union during World War II and its subsequent role in early Cold War era research and development, particularly related to Arctic military operations.
- Launch Complex 33 NHL 1945 to 1957 reflects the site's use for the V-2 rocket program after World War II, which was crucial for developing Cold War era rocketry and missile technology in the United States. While its operational lifespan extended beyond 1957, the early years are considered the most significant.
- Trinity Site NHL period of significance is centered around July 16, 1945. This is the date of the Trinity Test, the first detonation of a nuclear weapon. The Trinity test was conducted by the Army on White Sands Missile Range at 5:29 a.m., July 16, 1945, as part of the Manhattan Project.
- Opana Radar Site NHL period of significance is December 7, 1941. This single date marks when the radar site detected the incoming Japanese air attack on Pearl Harbor. While the detection was not effectively communicated in time to prevent the attack, the site represents the earliest warning of the attack and its role in the events of that day.

Associated built infrastructure constructed during the WWII and the Cold War eras (1941-1989) has been well documented, and the most significant representative properties in the Army inventory are preserved and managed as NHLs. Adverse effects of warfighting readiness activities and management actions on non-NHL Army WWII and Cold War era associated infrastructure are addressed by the existing comprehensive documentation and by the physical preservation of period NHL properties.

4.2.7. Effect Determinations. The effects of warfighting readiness activities and management actions on associated infrastructure are assessed as follows.

[12] Referenced nationwide NHPA compliance agreements are located at https://www.denix.osd.mil/army-cr/army-dod-comments. Also see references listed in footnote 7.

Adverse Effect:

- Physical damage or destruction of all or part of a Tier 1, Tier 2, or Tier 3 property.
- Alteration of NHLs and pre-1941 non-NHL buildings that is not consistent with the Secretary of the Interior Standards for Rehabilitation (36 CFR 68.3 (b)) as implement by the guidelines and procedures in Appendices C and D.
- Removal of a Tier 1, Tier 2, or Tier 3 property from its historic location.
- Neglect of a Tier 1, Tier 2, or Tier 3 property that causes significant deterioration.
- Transfer, sale or lease of Tier 1, Tier 2, or Tier 3 property out of Federal ownership.
- Introduction of visual, atmospheric or audible elements that diminish the integrity of significant historic features of PTRCI.
- Change in the character of PTRIC use or physical features within their setting that contribute to their significance.

Tier 4 Properties: Adverse effects to Tier 4 properties will be mitigated by the extensive existing documentation (see footnote 7) and physical preservation of the most significant NHL examples of those properties.

Interiors of Pre-1941 Buildings: Interior alterations and reconfiguration of interior floorplans in pre-1941 built infrastructure do not require further review due to the extensive modification and modernization that has occurred.[13] Where an existing interior floorplan does not accommodate current or changing military needs, technology requirements, quality of life considerations, force protection requirements, or health and safety considerations, floorplan alterations and reconfigurations will occur using substitute building materials or any modern industry standard building materials.

Army installations will resolve adverse effects to Tier 1, 2, and 3 historic properties following the Mitigation Measures for Adversely Affected Historic Properties.

4.2.8. Mitigation Measures for Adversely Affected Historic Properties.

General: The Army will strive to avoid adverse effects to historic properties. Where adverse effects to Tier 1, 2, and 3 historic properties cannot be avoided, a treatment plan will be developed by the installation in accordance with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716) to mitigate the adverse effect. Treatment plans should be technically and financially feasible and focus on mitigation of the historic property adversely affected.

Treatment plans for Tier 1 NHL properties will be developed in consultation with the ACHP and NPS. Treatment plans for Tier 2 PTRCI will be developed in consultation with Federally recognized Tribes and NHOs ascribing significance to the historic property. Treatment plans for

[13] The historic interior floorplans of pre-1941 built infrastructure have been modified and modernized by Army use over time; all current floorplans include rooms that were not features of the original design, new walls and partitions added that were not features of the original design, floors, walls, and ceilings cut through and modified to add plumbing, electrical service, and heating and ventilation ductwork, plaster walls replaced with drywall, paint and plaster removed to create a new appearance.

Tier 3 properties will be developed by the installation in coordination with their command. The Army FPO will approve installation treatment plans for Tier 1 NHL properties. Commands will approve installation treatment plans for Tier 2 and Tier 3 properties. No treatment plans will be required for Tier 4 properties since potential adverse effects will be mitigated by the extensive existing documentation of representative property types and by physical preservation of period NHLs.

Once completed, Army installations will make mitigation reports resulting from the treatment plan available via an installation public web site or by other means to the ACHP, SHPOs, Tribes, and NHOs for informational purposes. Mitigation reports will be subject to Army operational security review and be retained by the installation in accordance with Army document management and retention requirements. Specific locational information for sensitive historic properties is protected from disclosure to the maximum extent possible in accordance with Section 304 of the NHPA.

Standard mitigation measures for buildings, structures, districts, objects, and landscapes. Installations may address adverse effects to buildings, structures, districts, and landscapes associated with warfighting readiness activities that are significant under National Register criterion C through documentation prepared to the standards of the Historic American Building Survey (HABS), Historic American Engineering Record (HAER), Historic American Landscapes Survey (HALS) standards, or to equivalent State standards, as appropriate. Where such properties are significant under other National Register criteria, historical documentation appropriate to their significance or signage may be prepared.

Standard mitigation measures for archeological sites. To address adverse effects on archaeological sites and districts, installations may implement standard mitigation measures. These may include: (1) site avoidance; (2) site protection measures like capping or signage; (3) archaeological monitoring of ground-disturbing activities; or (4) data recovery excavations. Data recovery excavations will be conducted in accordance with the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. For archeological sites that are PTRCI, Indigenous Knowledge-informed mitigation will occur in accordance with the following section regarding mitigation measures for PTRCI. If data recovery is pursued, an archeological site mitigation report will be prepared.

Mitigation measures for properties of traditional religious and cultural importance. The Army recognizes that standard mitigation measures may not be applicable to PTRCI to Federally recognized Tribes and NHOs. To ensure Indigenous Knowledge-informed treatment occurs, installations will inform treatment plans through government-to-government consultation with the Federally recognized Tribe(s) ascribing significance to the property. Installations in HI will inform treatment plans through consultation with the NHO(s) ascribing significance to the property. For defined landscape areas that are considered PTRCI the Army may, as a mitigation measure, prepare ethnographic studies in coordination with Federally recognized Tribes or NHOs.

Alternative mitigation measures. The Army may implement alternative mitigation measures in lieu of the standard mitigation measures for any adversely affected historic property. Alternative

mitigation involves mitigative measures applied to property types other than those directly affected by the undertaking, or another type of creative mitigation. The Army may implement alternative mitigation on Army installations, Army owned and leased property, federal lands withdrawn by Army for military purposes, state lands used for federal warfighting readiness activities of the Army National Guard, and on properties with conservation easements. Alternative mitigations will be included in treatment plans. Alternative mitigation measures do not occur when standard mitigation measures may be applicable.

4.2.9. Avoiding duplication of effort for mitigation of pre-1941 built infrastructure. In constructing its extensive military infrastructure, the Army used standardized designs and plans for buildings, structures, districts, landscapes, and for entire installations.[14] The result of Army standardization is that the same designs for buildings, structures, districts, landscapes, housing, and overall installation designs are repeated, one after the other, on Army installations. The Army's pre-1941 built infrastructure was constructed following Army standardized plans; therefore, Army installations avoid duplicating mitigation efforts for such built infrastructure. When developing a treatment plan for mitigation of adverse effects to pre-1941 built infrastructure, installations and commands may identify if similar built infrastructure has been previously documented or if known better-preserved examples exist on the installation or elsewhere. If prior documentation or better-preserved examples sufficiently represent the adversely affected property, that information should be incorporated into the treatment plan to minimize redundant mitigation efforts.

4.2.10. National Mitigation Areas. National Mitigation Areas are locations where the Army has made a commitment to long-term stewardship of significant historic properties beyond the requirements of the NHPA. These areas, which include two National Monuments designated under the authority of the Antiquities Act (54 US Code § 32030) and a Native Hawaiian PTRCI, contain a high concentration of historic buildings, archaeological sites, historic districts, PTRCI, sacred landscapes, and significant natural resources and geological features.

The Army's NMAs are nationally significant heritage resources and represent an investment in historic preservation at a landscape scale. The Army's preservation of these areas can serve as compensatory mitigation for adverse effects to historic properties for areas with health and safety hazards as described below, and as an alternative mitigation option. The National Mitigation Areas are:

Carlisle Federal Indian Boarding School National Monument, Carlisle Barracks, PA: The Carlisle Federal Indian Boarding School National Monument was established under the authority of the Antiquities Act at the Army's Carlisle Barracks in December 2024 (89 FR 100289). The Army, recognizing the profound cultural significance of the Carlisle Indian Industrial School to Federally recognized Tribes, partnered with the Department of the Interior in this National Monument designation. The school's former campus is located within Carlisle Barracks, an Army installation with a history dating back to the Revolutionary War. The Barracks saw limited

[14] Context Study of the United States Army Quartermaster General Standardized Plans 1866-1942. US Army Corps of Engineers, Seattle District, 1997. A Study of United States Army Family Housing Standardized Plans, Volumes 1-5, Beth Grashof, Georgia Institute of Technology, 1986. National Historic Context for Department of Defense Installations, 1790-1940, Volumes 1-4. Referenced studies are found at https://www.denix.osd.mil/army-pchh/.

use by the Army following the Civil War. In 1879, Congress authorized the Secretary of War to transfer vacant military posts to the Secretary of the Interior for industrial training of Indian youth, including Carlisle Barracks, leading to the school's establishment in 1879. The Carlisle Indian School was the Nation's first off-reservation Federal Indian boarding school. From 1879 to 1918, over 7,800 children from 140 Tribes attended the Carlisle School. After the Department of the Interior closed the Carlisle Indian School, Carlisle Barracks was transferred back to the Army. While under Army stewardship the former Carlisle Indian School campus was designated as an NHL district in 1961. The 24 NHL historic structures associated with the Carlisle Indian School include residential, vocational, and athletic buildings that evoke the Federal Indian boarding school era. The National Park Service now collaborates with the Army and others to share the story of the school (see https://www.nps.gov/cibs/index.htm).

Castner Range National Monument, Fort Bliss, TX: Established on Fort Bliss in March 2023 (88 FR 17999) under the authority of the Antiquities Act, the Castner Range National Monument encompasses 6,672 acres. The Army ensures the protection of sacred sites, PTRCI, and natural ecosystems within the Castner Range National Monument (https://www.denix.osd.mil/crnm/). Castner Range remains undeveloped with historic properties preserved due to its history of military use. Since the cessation of live-fire exercises over half a century ago, Castner Range, under Army stewardship, is maintained as a natural Chihuahuan Desert ecosystem. Vital springs like Indian Springs, Cottonwood Springs, Mundy Springs, and Whispering Springs provide water sources and rare desert habitat for plants and wildlife. There are 41 identified prehistoric archeological sites on Castner Range containing ancient pit houses, roasting pits, ceramics, bedrock mortars, petroglyphs, and other archeological features and artifacts. The Army has listed archeological sites and districts on Castner Range in the National Register of Historic Places including the Fusselman Canyon Rock Art District, the Northgate Site, and the Castner Range Archeological District.

500 Acre Conservation Easement Protecting Kūkaniloko, Oʻahu, HI: Kūkaniloko is one of the most sacred Native Hawaiian places and is found within the cultural landscape of the Wahiawā Plateau on Oʻahu. This area was the royal birth site for high-ranking chiefs, known as aliʼi, and was utilized as a birth site well into the 17th century. Kūkaniloko is believed to be the geographical and spiritual center of Oʻahu and is also spiritually connected to other sacred sites in Hawaiʻi (see https://www.oha.org/wp-content/uploads/Attachment-6-OHA-Kukaniloko-Information-Sheet.pdf). In 2012 the Hawaiʻi State Legislature authorized $13 million towards the purchase of a conservation easement on 500 acres of sacred landscape surrounding Kūkaniloko for its protection. Army and its conservation partners including the Trust for Public Land and the Office of Hawaiian Affairs raised the additional $12 million required for purchase of the easement, which included over $4.5 million from the Army. As a result, the Office of Hawaiian Affairs received the 500-acre in-perpetuity easement surrounding Kūkaniloko for long-term conservation. The area is not open to the public and visits are coordinated through the Hawaiian Civic Club of Wahiawā. The Army provides resources for on-going land management and conservation activities on the 500-acre easement.

4.2.11. Limitation on Disclosure of Information. Section 304 of the NHPA (54 U.S.C. § 307103) authorizes Federal agencies to withhold from public disclosure information about the location, character, or ownership of a historic property if that disclosure may cause a significant

invasion of privacy, risk harm to the historic property, or impede the use of a traditional religious site by practitioners. Army compliance with 54 U.S.C. § 307103 is demonstrated by implementation of the following actions: Army installations will ensure that reports, documents, or other materials that address the location and character of sensitive historic properties (including archeological sites and PTRCI) are prepared and disseminated in a manner that maintains the confidentiality of such information. The determination to withhold information regarding the location and character of PTRCI is made in consultation with the property's affiliated Federally recognized Tribes and NHOs and pursuant to the requirements of Section 304.

4.2.12. Health and Safety Hazards. No further Section 106 review, including historic property identification, evaluation, assessment, monitoring, and mitigation activities will occur in known areas on Army installations where there are human health and safety hazards including areas containing unexploded ordnance (UXO) such as impact areas and surface danger zones, and contaminated land areas and contaminated properties. This program comment recognizes the inherent danger and unlikely prospect of identifying intact historic properties safely in areas on Army installations where there are human health and safety hazards. Any potential adverse effects that may occur to historic properties located in such areas are resolved by the preservation of historic properties within the National Mitigation Areas identified in this program comment.

4.2.13. Public Outreach, Access, and Comment. Army installations may foster transparency and strengthen civil-military relationships by providing public educational tours, cultural events, and partnerships with local schools and organizations. These programs, which often include museum exhibits and tours that highlight Army historic properties and preservation initiatives, provide the opportunity for the public to connect with heritage firsthand. Installation Public Affairs Offices may be contacted at any time for information pertaining to such installation public outreach events. For installations with PTRCI, access to those historic properties is provided to Tribes and NHOs for their cultural use. In addition, opportunities for the public to comment on installation activities will occur under installation actions to comply with comprehensive environmental review requirements. These actions will ensure that the public has a voice in decisions that may affect the environment and historic properties on installations.

5.0. Discovery of Historic Properties.

The discovery of a historic property during implementation of warfighting readiness activities will be addressed by the procedures in this section. If the discovery involves Native American or Native Hawaiian cultural items or human remains, the Native American Graves Protection and Repatriation Act (NAGPRA) and 43 CFR 10 will be followed in lieu of this program comment.

If an undertaking covered by this program comment has commenced and a discovery or unanticipated effects to a non-NAGPRA property occur, activities will cease in the immediate area of the discovery. The undertaking can continue in areas outside of the immediate protected area of the discovery. The installation will notify the ACHP, the relevant SHPO, and Federally recognized Tribes or NHOs of the discovery and proposed mitigation and will provide them with five (5) calendar days to comment.

The Army will consider any timely comments in assessing the National Register of Historic Places eligibility of the property under applicable National Register criteria. If the installation determines that the property is not a historic property, the undertaking can proceed in the area of the discovery. If the discovered property is determined by the installation to be a historic property and avoidance of adverse effects is not possible, the installation and command will consider any timely comments from the ACHP and SHPO, Federally recognized Tribe or NHO and prepare and implement a technically and financially feasible mitigation measure to resolve the adverse effect. If the property is identified by a Federally recognized Tribe or NHO as a PTRCI, the views provided by the Federally recognized Tribe or NHO will be a primary consideration in finalizing the mitigation measure. The undertaking may continue in a manner allowing for implementation of the mitigation measure. The installation will coordinate the mitigation with the command, incorporate command recommendations, carry out the mitigation measure, prepare the mitigation report, and summarize the action in their annual report.

If no responses are received within five calendar days of the notification, the installation will inform the ACHP, SHPO, Federally recognized tribe or NHO that it will implement the mitigation proposed by the installation, will make the mitigation report available to the ACHP, SHPO, Federally recognized Tribe or NHO, and will report the action in their annual report. The installation may afford additional time for Federally recognized Tribes or NHOs to provide their views if there are significant extenuating circumstances and no major impacts to the timing and cost of the undertaking.

6.0. Emergency Situations.

In the event that an installation proposes an essential and immediate response to a disaster or emergency declared by the President, a tribal government, or the Governor of a State or another immediate threat to life and property, the Army will implement 36 CFR § 800.12(b)(2). The Army will notify the ACHP, the appropriate SHPO / Tribal Historic Preservation Officer and any Indian tribe or NHO that may attach religious and cultural significance to historic properties likely to be affected prior to the undertaking and afford them an opportunity to comment within seven (7) calendar days of notification. If the Army determines that circumstances do not permit seven days for comment, the Army will notify the ACHP, the SHPO / THPO, and Indian tribe or Native Hawaiian organization and invite any comments within the time available.

This section applies only to undertakings that will be implemented within 30 days after the disaster or emergency has been formally declared by the appropriate authority. The Army may request an extension of the period of applicability from the ACHP prior to the expiration of the 30 days. In accordance with 36 CFR 800.12(d), immediate rescue and salvage operations conducted to preserve life or property are exempt from the provisions of Section 106 and 36 CFR § 800.

7.0. Annual Reporting and Annual Meeting.

On or before 1 February of each year, each installation with undertakings addressed under this program comment prepares an Annual Installation Program Comment Report for the preceding fiscal year. The installation annual report summarizes individual undertakings implemented

under the program comment and efforts to identify, evaluate, assess effects, and avoid or mitigate adverse effects to historic properties. The Annual Installation Program Comment Report is published by the installation on a publicly accessible website, following applicable requirements for information dissemination. When published, the installation informs relevant SHPOs, THPOs, Federally recognized Tribes, and NHOs that the annual installation report is available for their information. Annual reporting by installations occurs for the duration of this program comment.

After 1 February of each year, the Army FPO prepares an annual Army Program Comment Summary Report for previous fiscal year activities. The annual Army report provides an executive summary of activities under the program comment, identifies successes, significant challenges, how challenges were addressed, and how they may be avoided in the future. For real property acquired in the reporting year by the Army and incorporated into an existing Army installation, the annual Army report will summarize existing historic property inventory or knowledge base about the types of historic properties that may be present on such property. The annual report also includes an assessment of the overall effectiveness of the program comment in meeting its intent. The Army FPO submits the Program Comment Summary Report to the ACHP. Following report submission, the FPO meets with the ACHP and others as appropriate to discuss implementation of the program comment. Such annual reporting and annual meetings occurs for the duration of the program comment and may take place in-person, by phone, videoconference, or any combination of such methods.

8.0. Applicability.

The Army implements warfighting readiness activities and management actions on associated infrastructure in accordance with the terms of this program comment. This program comment applies to all warfighting readiness activities and management actions on associated infrastructure on installations of the Active Army, Army Reserves, and Army National Guard. This program comment applies to joint bases where the Army is the lead military service. This program comment will apply to all real property that is acquired by the Army and incorporated into to an existing Army installation.[15]

This program comment does not apply to any proposed undertakings that would take place off of, or affect historic properties located off of Army installations. This program comment does not apply to any proposed undertaking that may occur on or affect historic properties located on Tribal lands. This program comment does not apply to any proposed undertakings at Arlington National Cemetery. This program comment does not apply to Army-owned family housing or to privatized Army family housing. This program comment does not apply to Civil Works activities of the US Army Corps of Engineers.

[15] For real property acquired by the Army and incorporated into an existing Army installation, the Army will carry out historic property identification efforts when it does not have any existing inventory or knowledge base about the types of historic properties that may be present on such real property.

9.0. Duration.

This program comment is effective upon the date of its adoption by the ACHP and remains in effect through December 31, 2055, unless withdrawn earlier as provided herein.

The specified duration of this program comment aligns with the expiration dates of three program comments concerning historic Army housing.[16] No later than one year prior to the expiration of this program comment, the Army and the ACHP may identify a process for integration of this program comment and the program comments for historic Army housing. The intent is to further standardize Army Section 106 compliance procedures into a single comprehensive program alternative.

10.0. Amendment and Withdrawal.

Amendment. The terms of this program comment can only be changed following the amendment procedures of this program comment. All such proposed amendments are submitted by the ACHP to the Army FPO for a 30-day review and consultation period. Amendments will consider and address the Army's comments. Amendments to this program comment are subject to a vote and adoption by the ACHP membership. The ACHP will publish notice in the Federal Register regarding adopted amendments.

Withdrawal. If the ACHP membership determines that consideration of historic properties is not being carried out in a manner consistent with this program comment, the ACHP membership may propose withdrawal of the program comment only after consultation with the Army to resolve the inconsistency. The ACHP will publish a notice in the Federal Register of any vote to withdraw. If this program comment is so withdrawn, the Army complies with the requirements of 36 CFR § 800.3 – 800.7, or an applicable program alternative, for undertakings subject to this program comment.

11.0. Definitions.

The following definitions apply for the purposes of implementation of this program comment:

Abate or abatement means actions to eliminate, lessen, reduce, encapsulate, or remove hazardous or toxic materials, and unsafe conditions.

Alternative mitigation means actions taken to offset the unavoidable adverse effects of an undertaking on a historic property. Alternative mitigation may occur when mitigation actions on an adversely affected historic property are not financially or technical feasible, where there are national security implications, or other extenuating circumstances. Alternative mitigation may occur through other mitigative activities involving other historic properties.

[16] Program Comment for the Preservation of Pre-1919 Historic Army Housing, Associated Buildings and Structures, and Landscape Features, 89 FR 50350; Program Comment for Army Inter-War Era Historic Housing, Associated Buildings and Structures, and Landscape Features (1919–1940), 85 FR 64491; and Program Comment for Army Vietnam War Era Historic Housing, Associated Buildings and Structures, and Landscape Features (1963–1975), 88 FR 28573.

Area of potential effects means the same as the term's definition at 36 CFR § 800.16.

Associated infrastructure means the totality of all built infrastructure and natural infrastructure associated with Army warfighting readiness activities.

Built infrastructure means all buildings, structures, districts, objects, sites, and landscapes and landscape features. The built infrastructure includes the entire overall design and layout of Army installations including but not limited to cantonments, training areas, testing areas, ranges, maneuver areas, all buildings, structures, landscapes, landscape features, sites, districts, objects, facilities, research related properties, industrial and manufacturing areas and properties, warehouses, roadways and circulation patterns and systems, rail lines, bridges, dams, utility systems, mechanical systems, airfields, heliports, energy infrastructure, etc. Includes all man-made landscapes and landscape features. See Appendix B for additional detail on buildings and structures included in the built infrastructure.

Economic or Financial feasibility means the Army's assessment of relevant factors to determine if an action, project, or product to address a historic property are financially viable and sustainable. It considers the costs of building materials, labor, mitigation, among other factors against the available funding and longer-term financial resources to ensure the action is realistic, achievable, and will effectively preserve or document the property's historical value.

Health or safety hazards means land, buildings or structures that have any of the following conditions: violations of health and safety codes and standards; structurally unstable roofs or walls; non-functional or poorly functioning mechanical systems; rodent, insect, or mold infestations, lead based paint exposure risks; asbestos exposure risks; sites contaminated with hazardous substances, pollutants, contaminates, toxic chemicals and materials, or any other environmental hazards; damages due to fire, flooding, or natural disasters; and other conditions that present health hazards or make the land, buildings or structures unsafe.

Historic building materials means building materials that were used in the initial construction of a building, and for designated NHLs it means all materials within the period of significance.

Historic character means the same as the terms usage in the Secretary of the Interior's Standards for the Treatment of Historic Properties at 36 CFR 68.

Historic district or district means the same as the term's definition in 36 CFR 60.3(d). The terms historic district, archeological district, and district are used interchangeably in this program comment.

Historic property means the same as the term's definition in 36 CFR § 800.16.

Imitative substitute building materials or substitute building materials means modern, industry standard, natural, composite, and synthetic materials that that simulate the appearance of historic materials. They are used as alternatives to historic building materials and in-kind building materials when those materials are not financially or technically feasible, or where other factors such as contamination require replacement of historic building materials. The terms imitative

substitute building materials and substitute building materials are used interchangeably for the purposes of this program comment.

In-kind building materials means new building materials that are identical to historic building materials in all possible respects, including their composition, design, color, texture, and other physical and visual properties.

Industrial activity means all activities at all Army research laboratories, depots, arsenals, and ammunition plants involved in research, development, manufacturing, storing, maintaining, and disposal of Army weapons and materiel.

Installation means an aggregation of contiguous or near contiguous, common military mission-supporting real property holdings under the jurisdiction, possession, or control of the Department of the Army or of a State, commonwealth, territory, or the District of Columbia, and at which any unit or activity of the Active Army, Army Reserve, or Army National Guard is assigned or trains. Includes joint bases where Army is the lead military service.

Land means real estate that is fee-owned by the Federal Government and or under custody and accountability of the Army. Includes land acquired by purchase, condemnation, donation, transfer, permit, lease or other means. Includes reclaimed or accredited lands if title is vested in the Federal Government and such lands are under custody and accountability of the Army. The terms land and Army land are used interchangeably in this program comment.

Landscape and landscape features includes all plantings and landscaping, gardens, parade grounds, open spaces, recreational landscape features (including but not limited to recreational and athletic fields, playgrounds, golf courses, tennis courts, etc.), fencing, parking areas, garages, signage, site furnishings, parade grounds, lighting, sidewalks and curbing, driveways, setbacks, cemeteries, objects, statuary, monuments, archeological sites and districts, and all human influenced landscapes and landscape features. Includes all visual elements and viewsheds into historic properties and historic districts and out from any historic property or historic districts into other historic properties and districts, and all other landscape features.

Lease, transfer, and conveyance means the execution of documents for real property lease, sale, possession, management, operation, development, conveyance, or transfer of real property into or out of Army ownership, jurisdiction, or management. Includes execution of property transfers and conveyances of ground leases, easements, and property ownership. Includes Enhanced Use Leases (EUL) and all EUL associated development activities, public land withdrawals, and any other form of real property conveyance or transaction. In the event of a conflict or inconsistency between a lease, transfer, or conveyance document and this program comment with respect to the obligations pursuant to Section 106 of the NHPA, the terms of this program comment have primacy.

Maintenance and repair means all activities required to maintain the exterior of buildings and structures, mechanical systems, and exterior building features, elements, and materials in an operational state, or to bring them back to operating condition by repair or replacement of

obsolete, broken, damaged, or deteriorated mechanical systems, features, elements, and materials on exteriors.

Management actions are actions taken with respect to warfighting readiness associated infrastructure (see Appendix B) as follows:

- Associated Infrastructure: Management actions concerning associated infrastructure (built infrastructure and natural infrastructure) include real property transactions including leasing, acquisition, and disposal of any real property interests into or out of government ownership whether by purchase, lease, easement, transfer, sale, public land withdrawal, agricultural out leasing, or any other form of real property conveyance. Includes activities supporting establishment and use of Enhanced Use Leases on Army installations. Includes the transfer of national defense areas to the Army as new installations or for incorporation into existing installations.

- Built Infrastructure: Management actions concerning built infrastructure include maintenance, repair, rehabilitation, renovation, additions, improvements, abatement and remediation of health and safety hazards (such as lead based paint, asbestos, among others), mothballing, cessation of maintenance, and demolition. Includes new construction including major and minor military construction and construction on installations by parties other than the Army under EULs or other authorities.

- Natural Infrastructure: Management actions on Army land including all land management activities such as natural resources management, cultural resources management, integrated training area management, soil erosion control, and forestry operations. Includes natural resource extraction activities, such as mineral exploration, extraction, mining, mineral processing, timber harvesting and sales, and harvesting and/or collection of other resources. Includes the removal and/or detonation of unexploded ordnance (UXO) or discarded military munitions, includes the assessment, investigation, and/or implementation of removal or remedial actions to address releases of hazardous substances, pollutants, or contaminants.

Military landscape is composed of two components - built infrastructure and natural infrastructure, collectively referred to in this program comment as associated infrastructure. The military landscape encompasses the entirety of each Army installation including the totality of the associated infrastructure. The military landscape is the nationwide analytical framework for Section 106 compliance for Army warfighting readiness activities and management actions on associated infrastructure. The terms military landscape and installation military landscape are used interchangeably in this program comment.

Mitigation measure means an action that serves to resolve adverse effects on historic properties.

Mothballing means an action to close and deactivate buildings and structures for an extended period, with the intent that the property would be brought back to an operational status at some future time.

National Historic Landmark means historic properties formally designated as such by the Secretary of the Interior under the authority of the Historic Sites Act of 1935.

Natural infrastructure is addressed under Army Real Property Category Code 9, and it incorporates all Army lands, ecosystems, landscapes and viewsheds, natural features, and all other natural resources. Natural infrastructure includes forests, wetlands, rivers, streams, lakes, riparian areas, deserts, grasslands, prairies, habitats, vegetation, soils, mineral resources, archaeological and geological sites and features.

Rehabilitation means, in accordance with the Secretary's Standards for Rehabilitation at 36 CFR 68.3(b), the act or process of making possible an efficient compatible use for a property through repair, alterations and additions while preserving those portions or features that convey its historical, cultural or architectural values. Includes actions to improve energy efficiency, address obsolete, damaged, deteriorated, or defective interior and exterior building materials and elements, fencing, and all other changes to improve the quality of life, health, and safety of residents. Rehabilitation includes additions, exterior alterations, and adjacent or related construction allowed under the Secretary Standards for Rehabilitation (9) and (10).

Technical feasibility means the Army's assessment of relevant factors to determine if an action, project, or product is suitable, practical, viable, and can be successfully implemented in consideration of warfighting readiness requirements.

Testing or military testing means activities that evaluate weapons and materiel performance, safety, and reliability.

To the maximum extent possible means implementation of actions to the extent capable of being carried out with reasonable effort considering economic and technical feasibility.

Training or military training means activities that prepare units and Soldiers for combat operations.

Tribal lands means the same as the term's definition at 36 CFR § 800.16.

Viewshed includes all the area visible from a particular location, viewing point, or series of viewing points. It includes all visual elements and surrounding points that are in the line of sight from any location, viewing point, or series of viewing points and excludes all points and locations that are not visible and/or are obstructed by terrain, other natural features, human influenced features, man-made features, and points beyond the horizon. Includes all visual elements and viewsheds into historic properties and historic districts and out from any historic property or historic districts into other historic properties and districts, and all other landscape features. Viewsheds are addressed under this program comment as part of the military landscape and landscape features.

Warfighting readiness activities means those military training, testing, equipping, and industrial activities specified in Appendix A, and management actions occurring on associated infrastructure as specified in Appendix B.

12.0. Appendices.

Appendix A – Warfighting Readiness Category of Undertakings
Appendix B – Associated Infrastructure and Management Actions
Appendix C – Design Guidelines for Pre-1941 Buildings, Structures, and Landscapes
Appendix D – Building Materials Guidelines and Catalog for Pre-1941 Buildings, Structures, And Landscapes

Appendix A. Warfighting Readiness Category of Undertakings

This appendix describes the warfighting readiness category of undertakings and is organized as follows: 1. Training, 2. Testing, 3. Equipping, 4. Industrial Activities.

1. Training - Training includes military maneuvers and exercises. These activities may include ground disturbing activities and management actions on associated infrastructure which may adversely affect historic properties:

- Mission Essential Task List (METL) Training: This is the cornerstone of warfighting readiness. Units train to proficiently execute their assigned METL, which are the tasks critical to their wartime mission. This training is progressive, starting with individual skills and building up to collective tasks.

- Combined Arms Maneuver Training: Training that integrates different arms (infantry, armor, artillery, aviation, etc.) to achieve a common objective. This emphasizes coordinated movement, fire support, and communication.

- Live Fire Exercises (LFX): Essential for building confidence and competence in using weapons systems under realistic conditions. LFXs progress from individual weapon firing to complex combined arms scenarios.

- Situational Training Exercises (STX): Focused on specific tactical scenarios, STXs allow units to practice decision-making, execution, and problem-solving in a simulated combat environment.

- Field Training Exercises (FTX): Extended exercises conducted in a field environment to simulate the challenges of sustained combat operations. FTXs test a unit's ability to plan, execute, and sustain operations under demanding conditions.

- Urban Operations Training: Training in built-up areas to prepare for combat in urban environments, which presents unique challenges.

- Air Assault Operations Training: Training to conduct airmobile operations, including helicopter insertions, extractions, and resupply.

- Breach Training: Training to overcome obstacles, such as minefields and fortifications, to enable maneuver.

- Counter-IED (Improvised Explosive Device) Training: Crucial for mitigating the threat of IEDs, which have been a significant factor in recent conflicts.

- Combat Lifesaver (CLS) Training: Equipping Soldiers with the skills to provide immediate medical care on the battlefield.

- Close Quarters Combat (CQC) Training: Training for fighting in close-range, confined spaces.

- Electronic Warfare (EW) Training: Training to understand and counter enemy electronic warfare capabilities.

- Cyber Warfare Training: Increasingly important training to defend against cyberattacks and conduct offensive cyber operations.

- Joint Training Exercises: Training with other branches of the U.S. military and/or allied forces to improve interoperability and coordination.

- Command Post Exercises (CPX): Simulation-based exercises that focus on training the command and staff functions of a unit.

- Deployment Readiness Training Exercises: Exercises to test the unit's ability to deploy rapidly.

- Emergency Deployment Readiness Exercises (EDRE): Unannounced exercises to test the unit's ability to deploy rapidly.

- Mobilization Training Exercises: Exercises to simulate the process of mobilizing for deployment.

- Combat Training Center (CTC) Rotations (NTC, JRTC): Intensive, realistic training exercises conducted at specialized training centers. These rotations provide units with a rigorous evaluation of their warfighting capabilities.

- Mission Readiness Exercises (MRX): Exercises designed to assess a unit's ability to perform its assigned mission under realistic conditions.

- Internal and External Evaluations: Regular evaluations to assess unit readiness and identify areas where additional training or resources are needed.

2. Testing - Testing undertakings include military weapons and materiel testing on ranges and in facilities where a wide variety of testing activities occur, all aimed at evaluating the performance, safety, and reliability of weapons systems and materiel. These activities may include ground disturbing activities and management actions on associated infrastructure which may adversely affect historic properties:

- Live Fire Testing: This is the most common activity and involves firing weapons of all calibers, and types from small arms to large artillery, at various targets. The purpose is to assess accuracy, range, penetration, lethality, and overall effectiveness. This includes:

    - Direct Fire Testing: Testing weapons that are aimed directly at a target.

    - Indirect Fire Testing: Testing weapons that fire over a distance, relying on calculations and adjustments for accuracy.
    - Trajectory Analysis: Tracking the flight path of projectiles and other weapon systems to determine their range, accuracy, and consistency. This often involves sophisticated radar and optical tracking systems.
    - Penetration Testing: Firing rounds at different materials (armor, concrete, etc.) to determine the weapon's ability to penetrate various types of protection.

- Explosive Ordnance Disposal (EOD) Range Testing: Testing procedures and equipment for detecting, neutralizing, and disposing of unexploded ordnance.
- Extreme Temperature Testing: Exposing weapons and ammunition to extreme heat and cold to ensure they function reliably in all climates.
- Humidity Testing: Evaluating the effects of high humidity on weapon performance, corrosion resistance, and ammunition stability.
- Rain and Sand/Dust Testing: Simulating harsh weather conditions to assess the weapon's ability to function in adverse environments. This can involve rain towers, sandstorms, and dust chambers.
- Salt Fog Testing: Evaluating the corrosion resistance of weapons systems when exposed to saltwater environments, simulating maritime operations.
- Vibration and Shock Testing: Simulating the vibrations and shocks that weapons systems might experience during transport, handling, and use.
- Endurance Testing: Firing weapons for extended periods to assess their durability and identify potential failure points. This can involve thousands of rounds being fired in rapid succession.
- Component Testing: Testing individual components of a weapon system (e.g., firing mechanisms, sights, barrels) to identify weaknesses and ensure they meet performance standards.
- Maintenance and Repair Testing: Evaluating the ease of maintenance and repair of weapons systems, including the tools and procedures required.
- Usability Testing: Evaluating how easily and effectively soldiers can operate and maintain a weapon system. This includes assessing factors such as ergonomics, user interface, and training requirements.

- Safety Testing: Identifying and mitigating potential safety hazards associated with weapon systems. This includes testing for accidental discharge, malfunction, and other potential risks.

- Performance Under Stress Testing: Evaluating how soldiers perform with a weapon system under stressful conditions, such as fatigue, sleep deprivation, and exposure to combat noise.

- Electromagnetic Interference (EMI) Testing: Evaluating the susceptibility of weapons systems to electromagnetic interference from other electronic devices.

- Electronic Countermeasures (ECM) Testing: Testing the effectiveness of countermeasures designed to protect weapons systems from electronic attacks.

- Cybersecurity Testing: Assessing the vulnerability of networked weapons systems to cyberattacks.

- Target Acquisition and Tracking: Testing the ability of sensors and weapon systems to acquire, track, and engage targets.

- Sensor Performance Testing: Evaluating the performance of sensors such as radar, infrared cameras, laser rangefinders, and detection systems.

- Target Signature Management: Assessing the effectiveness of techniques to reduce the signature of targets, making them harder to detect.

- Range Safety: Ensuring the safety of all personnel and equipment on the range. This includes establishing safety zones, safety shelters, enforcing safety procedures, and providing emergency medical services.

- Training Area and Test Range management. This includes Integrated Training Area Management (ITAM) activities and all other land management activities.

- Target Preparation and Maintenance: Preparing and maintaining targets for testing. This includes setting up targets, repairing damage, and collecting data on target impact.

- Logistics and Support: Providing logistical support for testing activities, including transportation, fuel, ammunition, maintenance services, and instrumentation.

- Materiel Testing: Research, development, test, and evaluation (RDT&E) of a variety of equipment and processes such as protective equipment, decontamination, detection systems, obscurants, and hazard monitoring.

3. Equipping encompasses activities associated with providing the military with the necessary materiel, systems, and resources to successfully accomplish their assigned missions. Equipping is a critical function that directly impacts the readiness and effectiveness of the military. These activities may include ground disturbing activities and management actions on associated infrastructure which may adversely affect historic properties and include:

- Requirements Determination & Acquisition:
    - Identifying Needs: This involves analyzing missions, identifying capability gaps, and defining what equipment is needed to fill those gaps.
    - Market Research: This involves attending industry events, reviewing commercial products, and conducting preliminary testing of potential solutions.
    - Developing Requirements Documents: Formally outlining the required performance characteristics, features, and technical specifications of the equipment. This includes everything from weight and size to power requirements and environmental tolerances. These documents guide the acquisition process.
    - Acquisition Planning: Developing a strategy for acquiring the equipment. This involves choosing the appropriate acquisition pathway (e.g., traditional procurement, rapid fielding), determining funding sources, and establishing a timeline for delivery.
    - Source Selection/Contracting: Issuing solicitations to potential vendors, evaluating proposals, and awarding contracts to the best offeror(s). This is a highly regulated process designed to ensure fairness and transparency.
    - Prototyping and Testing: Developing and testing prototypes to validate design concepts, assess performance, and identify potential issues before committing to large-scale production. This phase often involves soldier feedback and rigorous field testing.
- Supply Chain Management & Distribution:
    - Manufacturing and Production: Once a design is finalized and a contract awarded, the manufacturer begins producing the equipment.
    - Warehousing and Storage: Receiving, inspecting, and storing equipment at designated warehouses and depots. Maintaining proper inventory levels and ensuring equipment is stored in accordance with environmental requirements.
    - Distribution Planning: Determining how to distribute equipment to units based on their operational needs, deployment schedules, and priorities.

- Transportation: Moving equipment from warehouses and depots to units, both domestically and internationally. This involves coordinating transportation modes (e.g., trucks, trains, ships, aircraft) and managing logistics.

- Issue: Formally issuing equipment to soldiers and units, documenting the transaction, and ensuring accountability. This involves matching the right equipment to the right personnel based on their roles and responsibilities.

- Sustainment and Maintenance:

  - Field Maintenance: Performing routine maintenance and repairs on equipment in the field. This includes tasks like cleaning, lubrication, adjustments, and minor component replacements.

  - Depot Maintenance: Conducting more extensive repairs and overhauls at specialized maintenance facilities. This often involves replacing major components, restoring equipment to original specifications, and extending its service life.

  - Supply Support: Providing replacement parts, components, and consumables to support maintenance activities. This involves managing inventory levels, forecasting demand, and procuring spare parts from vendors.

  - Technical Manuals & Training: Developing and distributing technical manuals and providing training to soldiers on how to operate, maintain, and repair equipment.

  - Modification and Upgrades: Modifying or upgrading existing equipment to improve its performance, enhance its capabilities, or address emerging threats. This can involve adding new features, replacing obsolete components, or enhancing security.

- Accountability and Disposal:

  - Tracking and Accountability: Maintaining accurate records of all equipment, from procurement to disposal. This involves using tracking systems to monitor equipment location, usage, and maintenance history.

  - Inventory Management: Conducting regular inventories to verify the accuracy of equipment records and identify any discrepancies.

  - Disposal: Properly disposing of equipment that is no longer needed or is beyond repair. This involves following environmental regulations and ensuring that sensitive information is securely erased from electronic devices.

  - Turn-in/Reassignment: Transferring equipment from one unit to another as needs change. This ensures efficient use of resources and minimizes the need for new purchases.

4. Industrial activities include research, development, testing, evaluation, manufacturing, storing, maintaining, shipping, disposing of materiel, and all other activities conducted at Army laboratories, depots, arsenals, ammunition plants, and other locations. These organic industrial base (OIB) installations and activities are a vital asset that supports the readiness and effectiveness of the Army by providing a wide range of manufacturing, maintenance, research, and logistics capabilities. These activities may include ground disturbing activities and management actions on associated infrastructure which may adversely affect historic properties and include:

- Manufacturing/Production:
    - Component Manufacturing: Producing specific parts and components for weapon systems, vehicles, and other equipment. This often involves machining, casting, forging, and other specialized manufacturing processes. Examples include producing replacement parts for tanks, aircraft engines, or artillery systems.
    - Ammunition Production: Manufacturing a wide range of ammunition, from small arms rounds to artillery shells and missile components. This involves complex chemical processing, assembly, and quality control procedures. This is a critical capability for wartime surge capacity.
    - Prototype Development: Designing and building prototypes of new equipment and systems. This allows the Army to test and evaluate new technologies before committing to large-scale production.
    - Specialized Tooling & Fixtures: Designing and manufacturing specialized tools, jigs, and fixtures needed for maintenance and production activities within the OIB and for use by field maintenance teams.
- Maintenance, Repair, and Overhaul (MRO):
    - Depot Maintenance: Conducting in-depth repairs and overhauls of weapon systems, vehicles, and other equipment that are beyond the capabilities of field maintenance units. This often involves disassembling equipment, inspecting components, replacing worn or damaged parts, and reassembling the equipment to like-new condition. Examples include rebuilding tank engines, overhauling helicopters, or repairing artillery pieces.
    - Reset: Restoring equipment that has been heavily used or damaged during combat operations to a fully mission-capable condition. This is a major activity following deployments and involves comprehensive inspections, repairs, and upgrades.
    - Service Life Extension Programs (SLEP): Extending the service life of existing equipment by upgrading components, improving performance, and addressing obsolescence issues. This is a cost-effective alternative to replacing entire systems.

- Calibration and Repair of Test Equipment: Maintaining and repairing the sophisticated test and measurement equipment used throughout the OIB and by field units. This ensures accurate testing and calibration of equipment.

- Research, Development, and Engineering (RD&E):
  - Technology Development: Conducting research and development to improve existing equipment and develop new technologies for future weapon systems.
  - Engineering Support: Providing engineering expertise to support manufacturing, maintenance, and repair activities. This includes developing technical drawings, troubleshooting problems, and designing modifications.
  - Materials Testing and Analysis: Analyzing the properties of materials used in Army equipment to identify potential weaknesses and improve performance.
  - Reverse Engineering: Disassembling and analyzing foreign equipment to understand its design and capabilities. This information can be used to develop countermeasures and improve US Army equipment.
  - Manufacturing Technology (ManTech) Development: Improving manufacturing processes and technologies to reduce costs, improve quality, and increase production efficiency. This is crucial for maintaining the competitiveness of the OIB.

- Logistics and Supply Chain Management:
  - Warehousing and Storage: Storing critical parts, components, and materials needed for manufacturing, maintenance, and repair activities.
  - Supply Chain Management: Managing the flow of materials and components from suppliers to the OIB and from the OIB to Army units.
  - Transportation: Transporting equipment and materials between OIB facilities and other locations.
  - Inventory Management: Maintaining accurate records of all inventory and ensuring that critical items are available when needed.

Appendix B. Associated Infrastructure and Management Actions.

Associated infrastructure is comprised of built infrastructure and natural infrastructure on Army installations. This appendix describes the Army's associated infrastructure and the management actions occurring on associated infrastructure. This appendix is organized as follows: 1. Built Infrastructure, 2. Natural Infrastructure, 3. Management Actions on Associated Infrastructure.

1. Built Infrastructure: Built Infrastructure is categorized in the Army real property inventory into Category Codes 1 through 8.

SUMMARY: BUILT INFRASTRUCTURE 45 YEARS AND OLDER

Categories	Building/Structure Type	Number of Buildings	Number of Structures	Number of Linear Structures	Total
Category 1	Operational and Training	6856	9178	1809	17843
Category 2	Maintenance and Production	4247	81	0	4328
Category 3	Research, Development, Test, and Evaluation	1237	1042	1	2280
Category 4	Supply	22380	3470	4	25854
Category 5	Hospital & Medical	322	0	0	322
Category 6	Administrative	2187	2603	0	4790
Category 7	Housing & Community	8046	2941	11	10998
Category 8	Utility & Ground Improvements	1701	10083	43730	55514
Totals		46976	29398	45555	**121929**

SUMMARY: SUBSET OF BUILT INFRASTRUCTURE CONSTRUCTED PRIOR TO 1941

Categories	Building/Structure Type	Number of Buildings	Number of Structures	Number of Linear Structures	Total
Category 1	Operational and Training	596	579	13	1188
Category 2	Maintenance and Production	250	2	0	252
Category 3	Research, Development, Test, and Evaluation	87	57	0	144
Category 4	Supply	876	62	0	938
Category 5	Hospital & Medical	59	0	0	59
Category 6	Administrative	520	142	0	662
Category 7	Housing & Community	936	431	0	1367
Category 8	Utility & Ground Improvements	118	771	4488	5377
Totals		3442	2044	4501	**9987**

*Best available information as of 7 July 2025

Category 1. Operational and Training: This category encompasses the range of facilities supporting military operations, training, and infrastructure. It includes communication and information technology centers, air and sea operations buildings, training facilities (classrooms, firing ranges, simulators), headquarters and administrative buildings, academic and general instruction buildings, logistics and maintenance buildings, safety and security structures, and reserve component centers. The facilities support a wide array of activities from command and control to academic and technical training, and operational readiness.

- **Predominant Current Use Category Code (Catcode) Examples:** includes but not limited to 11110, 11111, 11120, 11121, 11130, 11131, 11150, 11151, 11212, 11213, 11221, 11222, 11310, 11311, 11320, 11321, 11330, 11340, 11350, 11351, 11370, 11380, 11610, 12110, 12120, 12210, 12310, 12311, 12312, 12322, 12411, 12412, 12413, 12450, 12451, 12452, 12454, 12455, 12460, 12461, 12470, 12471, 12473, 12480, 12481, 12482, 12483, 12495, 12620, 12621, 12630, 12640, 13115, 13120, 13125, 13131, 13135, 13140, 13160, 13170, 13175, 13181, 13185, 13220, 13252, 13310, 13320, 13410, 13430, 13440, 13450, 13470, 13610, 13612, 13613, 13615, 13620, 13621, 13670, 13710, 14110, 14111, 14112, 14113, 14114, 14115, 14116, 14121, 14126, 14129, 14132, 14133, 14140, 14150, 14160, 14161, 14162, 14163, 14164, 14165, 14166, 14169, 14170, 14171, 14175, 14176, 14177, 14178, 14179, 14180, 14181, 14182, 14183, 14184, 14185, 14186, 14187, 14188, 14190, 14310, 14915, 14916, 14920, 14925, 14935, 14937, 14940, 14953, 14955, 14958, 14960, 14961, 14962, 14963, 14970, 14971, 14975, 15110, 15210, 15410, 15430, 15432, 15510, 15610, 15930, 16310, 16420, 16430, 16440, 17115, 17119, 17120, 17121, 17122, 17123, 17125, 17131, 17132, 17133, 17134, 17135, 17136, 17137, 17138, 17139, 17140, 17141, 17142, 17170, 17180, 17210, 17211, 17212, 17213, 17214, 17710, 17711, 17720, 17721, 17730, 17731, 17771, 17801, 17802, 17803, 17804, 17805, 17806, 17808, 17809, 17810, 17811, 17812, 17813, 17814, 17816, 17821, 17822, 17823, 17829, 17831, 17832, 17833, 17834, 17841, 17842, 17844, 17845, 17851, 17852, 17854, 17855, 17856, 17857, 17858, 17859, 17860, 17861, 17862, 17863, 17864, 17865, 17866, 17867, 17868, 17871, 17872, 17878, 17879, 17880, 17881, 17882, 17883, 17884, 17885, 17886, 17887, 17888, 17891, 17892, 17893, 17894, 17895, 17896, 17897, 17898, 17901, 17902, 17908, 17910, 17911, 17912, 17914, 17948, 17949, 17950, 17951, 17952, 17954, 17955, 17958, 17959, 17961, 17962, 17963, 17964, 17965, 17966, 17971, 17972, 17974, 17976, 17979, 17980, 17981, 17982, 17983, 17984, 17987, 17991, 17992, 17993, 17994, 17995, 17996, 17998, 17999
- **Examples:** includes but not limited to Fixed Wing Runway, Paved; Runway / Fixed Wing - Unsurfaced; Rotary Wing Landing Pad, Unpaved; Fixed Wing Taxiway, Unpaved; Rotary Wing Parking Apron, Paved; Aircraft Maintenance Parking Apron, Paved; Aircraft Runway Holding Apron, Unpaved; Liquid Propane Gas Storage Tank, Above Ground; Pol Pipeline, Underground; Communication Lines, Above Ground; Flight Control Tower; Airfield Operations Building; Weather Station; Munitions Operations Management Building; Fueling/Pol/Wash Support Facility; Land Vehicle Fueling Facility, Ethanol 85 (E-85); Aircraft Fuel Storage Tank, Jet, Above Ground; Land Vehicle Fuel Storage Tank, Mogas, Underground; Radio Beacon; Instrument Landing System; Runway Lighting;

Visual Approach Slope Indicator; Aircraft Arresting System; Vehicle Test Track; Vehicle Defueling Facility; Pier; Bulkheads; Range Operations And Storage Building; Maneuver/Training Area, Heavy Forces; Impact Area Dudded; Automated Field Fire (Aff) Range; Known Distance (KD) Range; Machine Gun Field Fire Range; Light Antiarmor Weapons (Law/At-4) Range Live; Field Artillery Scaled Range; Air Defense Gunnery Range; Live Fire Exercise Shoothouse; Hand Grenade Qualification Course (Nonfiring); Engineer Qualification Range, Nonstandardized; Leadership Reaction Course; Mine Warfare Area; Ship Loading And Unloading Mockup; Fire Fighting And Rescue Training Area; Personnel/Equipment Drop Zone; Obstacle Course; Land Navigation Course; Access Control Facility; Information Systems Facility; Simulations Center; Observation Tower.

Category 2 - Maintenance and Production: This category includes maintenance and production facilities supporting military equipment, vehicles, and weaponry. It encompasses aircraft maintenance hangars and shops, vehicle maintenance facilities ranging from small arms repair to heavy gun shops, and specialized facilities for missiles, electronics, and radar. Furthermore, it includes production plants for ammunition, explosives, and various weapon components, as well as quality assurance and calibration facilities to ensure operational readiness.

- **Predominant Current Use Catcodes:** includes but not limited to 21110, 21113, 21114, 21115, 21117, 21120, 21130, 21140, 21210, 21330, 21340, 21406, 21407, 21408, 21409, 21410, 21411, 21412, 21413, 21414, 21415, 21416, 21417, 21418, 21419, 21435, 21440, 21441, 21445, 21458, 21462, 21470, 21510, 21520, 21522, 21530, 21540, 21610, 21612, 21622, 21630, 21632, 21640, 21642, 21650, 21660, 21670, 21710, 21712, 21730, 21835, 21840, 21845, 21850, 21855, 21865, 21870, 21872, 21879, 21881, 21882, 21885, 21887, 21910, 21922, 21925, 22125, 22210, 22410, 22412, 22430, 22510, 22525, 22530, 22535, 22537, 22548, 22610, 22612, 22616, 22618, 22620, 22622, 22624, 22625, 22626, 22628, 22630, 22635, 22638, 22640, 22650, 22655, 22660, 22665, 22670, 22680, 22685, 22810, 22930, 22960
- **Examples:** includes but not limited to Fixed Crane, Aircraft Maintenance Hangar, Aircraft Parts Storage, Vehicle Maintenance Facility, Depot Level, Munitions Demilitarization Facility, Ammunition Maintenance Facility, Depot Level, Steam Cleaning Facility, Depot Level, Rocket And Missile Maintenance Building, Ship Repair Shop, Component Cleaning Facility, Missile Maintenance Building, Area Maintenance Support Activity/Equipment Concentration Site, Weapon Quality Assurance/Calibration Facility, Depot Level, Munitions Maintenance And Renovation Building, Munitions Calibration Building, Electronics Maintenance Shop, Depot Level, Railroad Equipment/Engine Maintenance Shop, Engineer Maintenance Facility, Aircraft Production Structure, Combat Vehicle Assembly Plant, Small Arms Plant, Heavy Gun Plant, Propellant Charge/Cartridge Filling Building, Explosive Manufacturing Building, Chemical, Biological, Radiological Plant, Inert Renovation And Maintenance Building, Munition Production Buildings, Ammunition Plants, Metal Parts Production,

Ammunition Quality Assurance / Calibration Facility, Production, Special Weapons Plant, Leather/Textile/Clothing Plant, Ice Plant, Quarry/Rock Crusher Plant.

Category 3 - Research, Development, Test, and Evaluation: This category includes research laboratories for various scientific disciplines (chemistry, physics, metallurgy, human engineering, medical research), specialized buildings for different types of equipment and materials (aircraft, missiles, ordnance, chemicals, communication equipment), and testing facilities like climatic chambers and vibration test labs

- **Predominant Current Use Catcodes:** includes but not limited to 31010, 31015, 31020, 31030, 31040, 31050, 31060, 31065, 31066, 31071, 31110, 31210, 31220, 31410, 31510, 31610, 31620, 31710, 31720, 31730, 31740, 31810, 31820, 31910, 31920, 31930, 32110, 37110, 37120, 39014, 39018, 39024, 39028, 39030, 39034, 39038, 39040, 39064, 39068, 39069, 39075, 39076, 39080
- **Examples:** includes but not limited to Chemistry Lab; Greenhouse, R&D; Metallurgy Lab; Nuclear Physics And Chemical Lab; Physics Lab; Human Engineering Lab; Medical Research Lab; Climatic Chamber Building; Biosafety Level 3 Laboratory; Engineer R&D Laboratory; Aircraft And Flight Equipment Building; Astronautical And Geophysical Building; Guided Missile Building; Ground Transport Equipment Building; Ordnance Building; Chemical Equipment And Material Building; Ammunition/Explosives/Toxics Building; Communication Equipment Building; Detection Equipment Building; Electrical Equipment Building; Electronic Equipment Building; Nuclear Propulsion Building; Propulsion Systems Building; Nonmetallic Material Building; Lab And Test Building, General Purpose; Vibration Test Lab; Precision Machine Shop; RDT&E Range Buildings; RDT&E Range Structures.

Category 4- Supply (General and Ammunition/Explosives): This category includes all storage-related facilities, primarily for ammunition, explosives, and hazardous materials, categorized by operational level (Depot, Installation, Unit). It includes specialized magazines for different ammunition types, buildings for hazardous and radioactive materials, general-purpose storage, vehicle storage, and facilities with controlled environments.

- **Predominant Current Use Catcodes:** includes but not limited to 1121, 41123, 41130, 41131, 41140, 41141, 41150, 41180, 41210, 42104, 42107, 42110, 42120, 42150, 42170, 42180, 42181, 42182, 42183, 42184, 42186, 42210, 42215, 42225, 42230, 42231, 42235, 42240, 42250, 42260, 42280, 42281, 42283, 42285, 42286, 42288, 42310, 42311, 42410, 42510, 43211, 44110, 44130, 44135, 44150, 44160, 44180, 44181, 44182, 44210, 44215, 44216, 44217, 44220, 44222, 44223, 44224, 44226, 44227, 44228, 44230, 44240, 44250, 44260, 44262, 44263, 44271, 44288, 45110, 45210
- **Examples:** includes but not limited to Ammunition Storage Pad; Open Storage Area, Depot Level; Open Storage Area, Installation; Explosive Transfer Building, Depot Level; Earth Covered Magazine (ECM); Fuse And Detonator Magazine, Depot Level; High Explosive Magazine, Depot Level; Smokeless Powder Magazine, Depot Level; Guided Missile Magazine, Depot Level; Igloo Storage, Depot Level; Above Ground Magazine;

Small Arms Ammunition Magazine, Depot Level; General Purpose Magazine, Depot Level; Service Magazine; Ammunition Storage Building, Depot Level; Fuse And Detonator Magazine, Installation; High Explosive Magazine, Installation; Smokedrum Storehouse, Installation; Small Arms Ammunition And Pyrotechnics Magazine, Installation; Ammunition Storehouse, Installation; Ready Magazine, Installation; Fixed Ammunition Magazine, Installation; Special Weapons Magazine, Installation; Guided Missile Magazine, Installation; Igloo Storage, Installation; Ammunition Hut; Ready Munition Storage; Unit Small Arms Ammunition Storage, Installation; Ammunition Storage Other Than Depot Or Unit; Battery Cold Storage Building; Cold Storage Building, Installation; Storage Building, General Purpose, Depot Level; Controlled Humidity Warehouse, Depot Level; Hazardous Material Storage, Depot Level; Flammable Material Storehouse, Depot Level; Radioactive Storage Warehouse, Depot Level; Vehicle Storage Building, Depot Level; Aircraft Production Parts Storage, Installation; Storage Silo; Storage Building, General Purpose, Installation; Storage Shed, General Purpose, Installation; Arms Building For Battalion And Above; Organizational Storage Building; Covered Storage Building, Installation; Central Issue Facility; Hazardous Material Storage Building, Installation; Controlled Humidity Warehouse, Installation; Flammable Material Storehouse, Installation; Underground Storage Facility, Installation; Radioactive Storage Warehouse, Installation; Vehicle Storage Shed, Installation; Vehicle Storage Building, Installation; Consolidated Housing Furniture Storage; Installation Storage Other Than Depot Or Organizational Jet Fuel Storage, Above Ground, Bulk; Jet Fuel Storage, Underground, Bulk; Diesel Oil/Jp8 Storage, Above Ground, Bulk; Diesel Oil/Jp8 Storage, Underground, Bulk; Gasoline Storage, Above Ground, Bulk; Gasoline Storage, Underground, Bulk; Liquified Gas Storage, Above Ground, Bulk; Fuel Oil Storage, Above Ground, Bulk; Liquid Storage Nonpropellant; Ammunition Storage Structure, Installation; Liquid Propellant Storage, Ammunition, Building; Liquid Propellant Storage, Ammunition, Tank; Open Warehouse, Depot Level; Vehicle Storage Facility, Depot Level; Oxygen Storage Facility, Installation; Acetylene Storage Facility.

Category 5 - Hospital & Medical: This category includes facilities related to healthcare and medical services. It includes hospitals, clinics (dental, health, troop medical), laboratories, pharmacies, and veterinary facilities. Additionally, it covers support buildings like medical warehouses and ambulance garages, as well as administrative offices for medical commands.

- **Predominant Current Use Catcodes:** includes, but not limited to 51010, 51016, 53020, 53025, 53040, 53045, 53060, 53071, 54010, 55010, 55011, 55012, 55020
- **Examples:** includes but not limited to Medical Center/Hospital; Medical Command Administration; Laboratory; Pharmacy; Veterinary Facility; Animal Shelter; Medical Warehouse; Ambulance Garage; Dental Clinic; Health Clinic; Army Health Clinic; Army Troop Medical Clinic.

Category 6 – Administrative: This category includes administrative offices.

- **Predominant Current Use Catcodes:** includes but not limited to 61001, 61002, 61050, 61055, 61065, 61070, 61075, 62010, 69010, 69020, 69030
- **Examples:** includes, but not limited to Administration Building, General Purpose; Flagpole; Information Stand; Facility Information Sign; Military Entrance Processing Station (MEPS); Recruiting Station: Storefront; Administration Building, General Purpose; Waiting Area/In-Out Processing; Technical Library; Red Cross Building; Courtroom.

Category 7 - Housing & Community: This category encompasses facility types found on military installations covering essential services, training, and support. It includes unaccompanied personnel housing (barracks), dining facilities, lodging, educational and religious buildings, cemeteries, law enforcement and confinement facilities, commissary, exchange, laundry, and physical fitness facilities.

- **Predominant Current Use Catcodes:** includes but not limited to 75011, 71450, 72010, 72111, 72114, 72115, 72121, 72122, 72170, 72181, 72210, 72212, 72310, 72350, 72360, 72410, 72412, 72510, 73010, 73011, 73012, 73013, 73015, 73016, 73017, 73018, 73019, 73028, 73030, 73032, 73046, 73050, 73070, 73072, 73073, 73074, 73075, 73080, 74003, 74006, 74009, 74010, 74011, 74012, 74013, 74016, 74017, 74019, 74020, 74021, 74022, 74023, 74024, 74025, 74028, 74029, 74030, 74031, 74033, 74034, 74035, 74036, 74040, 74041, 74046, 74047, 74048, 74049, 74050, 74051, 74052, 74053, 74054, 74055, 74056, 74058, 74060, 74062, 74065, 74066, 74068, 74069, 74070, 74072, 74075, 74076, 74078, 74079, 74080, 74082, 74085, 74087, 74089, 75070, 76010, 76011, 76012, 76013, 72520, 73056, 74059, 75017, 75018, 75020, 75021, 75022, 75024, 75025, 75027, 75029, 75030, 75036, 75040, 75041, 75042, 75044, 75050, 75052, 75060, 75061, 75062, 75065, 75080, 75084, 75085, 75086, 75087, 76020, 76030, 76033

- **Examples:** includes but not limited to Storage Building; Trailer Park Service Building; Army Lodging; Permanent Party (Pp) Unaccompanied Housing (Uh), Junior Enlisted & Junior NCO; Collective Training (Ct) Unaccompanied Housing (Uh), Open-Bay; Collective Training (Ct) Unaccompanied Housing (Uh), Mobilization; Institutional Initial Military Training (IIMT) Unaccompanied Housing (Uh), Non-Open-Bay; Institutional Post-Initial Military Training (IPIMT) Unaccompanied Housing (Uh); Permanent Party (Pp) Unaccompanied Housing (Uh), Senior NCO; Dining Facility; Dining Facility: Collective Training; Uh Laundry Building, Detached; Uh Miscellaneous Building; Permanent Party (Pp) Unaccompanied Housing (Uh), Officer; Collective Training (Ct) Unaccompanied Housing (Uh), Senior NCO And Officer; Collective Training (Ct) Hutment; Physical Fitness Center; Greenhouse; Golf Clubhouse; Golf Course Maintenance Building; Army Community Services Center; Community Activities Center; Conservation Building; Cemeteries; Recreational Lodging; Library Branch; Library Main; Consolidated Open Dining Facility; Enlisted Open Dining Facility; Officer Open Dining Facility; Riding Stable; Exchange Branch; Exchange Cafeteria; Exchange

Automotive Service Station; Exchange Main Retail Store; Exchange Maintenance Shop; Exchange Warehouse; Exchange Service Outlet.

Category 8 - Utility and Ground Improvements: This category includes utility and environmental facilities crucial for infrastructure support. It includes buildings and structures for power generation and distribution, heating and cooling, water supply and treatment (both potable and non-potable), and sewage and waste management. The facilities cover a range of essential services, ensuring the proper functioning of installations.

- **Predominant Current Use Catcodes:** includes but not limited to 81115, 81117, 81121, 81150, 81160, 81230, 81241, 81242, 81320, 81350, 81360, 82117, 82120, 82130, 82150, 82210, 82220, 82221, 82240, 82310, 82410, 82610, 82625, 82710, 83110, 83112, 83113, 83120, 83130, 83140, 83150, 83180, 83181, 83210, 83220, 83240, 83310, 83312, 83320, 83410, 83420, 84110, 84125, 84130, 84141, 84150, 84210, 84215, 84330, 84450, 84470, 84472, 84510, 84610, 84620, 84710, 84720, 84730, 84740, 85110, 85120, 85130, 85150, 85210, 85211, 85212, 85215, 85216, 85220, 85221, 85225, 85230, 85710, 85715, 85720, 85725, 85730, 86010, 86110, 86120, 86130, 86140, 87110, 87120, 87130, 87140, 87150, 87151, 87171, 87210, 87224, 87230, 87250, 88010, 88111, 88120, 88221, 89111, 89113, 89115, 89120, 89121, 89123, 89126, 89127, 89131, 89133, 89141, 89144, 89148, 89150, 89210, 89215, 89220, 89225, 89230, 89240, 89250, 89260, 89270, 89280, 89310, 89320, 89330, 89340, 89410, 89510, 89520, 89530, 89550, 89560, 89570
- **Examples:** includes but not limited to Electric Power, Oil-Fired; Electric Power, Gas-Fired; Electric Power, Nuclear; Uninterruptable Power Supply; Standby Generator; Exterior Lighting; Substation; Electrical Switching Station; Transformers; Heating Plant, Dual-Fuel; Heating Plant, Oil-Fired; Heating Plant, Gas-Fired; Heating Plant, Steam; Gas Generating Plant; Air-Conditioning/Refrigeration Plant; Heat Pump; Primary Waste Water Treatment; Secondary Waste Water Treatment; Advanced Waste Water Treatment; Septic Tank And Drain Field; Raw Sewage Lagoon And Oxidation Pond; Industrial Waste Water Treatment Plant; Sewage Lift Station; Gravity Oil And Grease Separator; Water And Grit Separator; Incinerator Facility; Refuse Collection Facility; Recycling Facility; Sanitary Landfill; Hazardous Waste Landfill; Water Treatment Plant; Filter Plant Facility; Water Well, Potable; Pump Station, Potable; Chlorinator Facility; Chlorinator Facility, Nonpotable; Water Source, Nonpotable; Pump Station, Nonpotable; Water Storage Tank, Potable; Reservoir, Potable; Water Storage Tank, Nonpotable; Reservoir, Nonpotable; Fire Protection Pond; Water Retaining Basin; Cantonment Area Roads, Paved; Vehicle Bridge; Organizational Vehicle Parking, Paved; Organization Vehicle Parking, Unpaved; Nonorganizational Vehicle Parking, Paved; Nonorganizational Vehicle Parking, Unpaved; Sidewalks, Stairs, And Walkways, Paved; Sidewalks And Walkways, Unpaved; Pad; Pedestrian Bridges; Training Area Bridge; Railroad Tracks; Railroad Bridge; Railroad Scales; Coal Trestle; Drainage Ditch; Dikes; Retaining Structure; Storm Water Retention/Detention Ponds; Fencing And Walls; Mechanical Security Barricade; Gate; Dam; Special Fire Extinguishing System; Power Plant Building; Compressed Air Plant; Sewage /Waste Treatment Building; Water Supply/Treatment Building, Potable;

Monitoring Wells; Environmental Test Facility; Energy Management Control System (EMCS); Gas Storage Tanks; Traffic Signals; Fire Hydrants; Railroad Crossing Signals; Decorative Fountain/Pond; Lightning Protection System, Standalone; Utilidors; Cooling Towers; Imhoff Tank; Pollutant Catch Basin; Sewage Holding Tank; Waste Pol Storage Tank; Hazardous Waste Holding Tank; Fuel Product Recovery Tank; Power Substation/Switching Station Building; Environmental Test Laboratory; Plant/Utilities Building; Heating Plant Building; Refrigeration/Air-Conditioning Building; Combined Air-Conditioning/Heat Plant Building; Refuse And Garbage Building; Water Supply Building, Nonpotable; Water Storage Building; Shredder Facility; Cooling Towers Overhead Electric Lines; Underground Electric Lines; Steam Condensate Lines; Hot Water Lines; Hot/Chilled Water Lines; Steam Lines; Gas Pipelines; Chilled Water Distribution System; Sanitary Sewer; Combined Sewer; Industrial Waste Sewer; Water Distribution Lines, Potable; Supply Main, Potable; Fire Protection System, Non-Potable; Water Distribution Lines, Nonpotable; Cantonment Area Roads, Unpaved; Cantonment Area Tank Trails; Staging/Marshaling Area; Training Area Roads, Paved; Training Area Roads, Unpaved; Training Area Tank Trails, Paved; Training Area Tank Trails, Unpaved; Crane Tracks; Storm Sewer; Irrigation Facility; Pollutant Drainage System; Security Fence; Fire Alarm System; Flood Control Levee/Floodwall; Inert Gas Line; Compressed Air Line; Vacuum Line.

2. Natural Infrastructure. Natural Infrastructure is categorized in the Army real property inventory under Category Code 9.

Category 9 - Real Estate: This category includes all Army installation lands.

Predominant Current Use Catcodes includes but is not limited to 91110, 91120, 91130, 91131, 91140, 91141, 91150, 91510, 91520, 91530, 91531, 91540, 91541, 91550, 91210, 91310, 91320, 91330, 91340, 91350, 91360, 91370, 91410, 92110, 92111, 92112, 92120, 92121, 92130, 92131, 92210, 92212, 92320

- **Examples** include but are not limited to land purchased, condemned, donated, or transferred to the U.S. Government for Army use; land that has been withdrawn from the public domain; land used by the Army through a license or permit; public land acquired from United States territories or possessions; land purchased, donated, or transferred to a state specifically for National Guard use; easements that allow access for special purposes like clearance, utility, or right-of-way; and land that is leased by the Army or a state for military installation use.

3. Management Actions on Associated Infrastructure.

- **Associated Infrastructure:** Management actions concerning associated infrastructure (built infrastructure and natural infrastructure) include real property transactions including leasing, acquisition, and disposal of any real property interests into or out of government ownership whether by purchase, lease, easement, transfer, sale, public land withdrawal, agricultural out-leasing, or any other form of real property conveyance. Includes activities supporting establishment and use of Enhanced Use Leases on Army

installations. Includes the transfer of national defense areas to the Army as new installations or for incorporation into existing installations.

- **Built Infrastructure:** Management actions concerning built infrastructure include maintenance, repair, rehabilitation, renovation, additions, improvements, abatement and remediation of health and safety hazards (such as lead based paint, asbestos, among others), mothballing, cessation of maintenance, and demolition. Includes new construction including major and minor military construction and construction on installations by other parties.

- **Natural Infrastructure:** Management actions concerning natural infrastructure include all land management activities such as natural resources management, cultural resources management, integrated training area management, soil erosion control, and forestry operations. Includes natural resource extraction activities, such as mineral exploration, extraction, mining, mineral processing, timber harvesting and sales, and harvesting and/or collection of other resources. Includes the removal and/or detonation of unexploded ordnance (UXO) or discarded military munitions, includes the assessment, investigation, and/or implementation of removal or remedial actions to address releases of hazardous substances, pollutants, or contaminants.

Appendix C. Design Guidelines for Pre-1941 Buildings.

The *Secretary's Standards* at 36 CFR 68 provide guidance for the treatment of historic properties and address four treatment options: preservation, rehabilitation, restoration, and reconstruction. For exterior front facades of pre-1941 historic buildings and structures, the Army implements the *Secretary's Standards for Rehabilitation* at 36 CFR 68.3(b) through the application of these guidelines. Rehabilitation allows a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values. Per 36 CFR 68.3, application of the *Secretary's Standards for Rehabilitation* and these guidelines are contingent on economic and technical feasibility.

Character-Defining Features:

The character of a historic building is established by its form, size, scale, and decorative features. Character-defining features include the overall shape, style and design of the building, decorative details, as well as its associated buildings and structures, and landscape features. When identifying a building's character-defining features it is important to understand the features associated with a particular architectural style. Historic architectural styles used by the Army include Federal, Gothic Revival, Greek Revival, Italianate, Romanesque, Queen Anne, Craftsman, Colonial Revival, Spanish Colonial Revival, among others. It is important to understand that any given example of pre-1941 Army buildings will not exhibit all character-defining features or materials of its architectural style, has been modified over time, and may exhibit features of several different architectural styles.

Historic Architectural Styles and Character Defining Features:[17]

Federal 1780-1820, locally to 1840: Symmetry of façade with a central door, Side-gable or hipped roof, 6 over 6 double hung windows, elliptical fanlight or transom over door with sidelights, three-part window or Palladian window in center of upper floor, paneled door, cornice usually with dentil molding or other decorative molding, front porticos with classical columns, decorative details such as swags or festoons, quoins and pilasters, belt courses, curving stairs, dormers usually front gable, end chimneys, roof balustrades, cupolas.

Gothic Revival, 1840-1880: Steeply pitched gable roofs, parapets or castellated walls decorated vergeboards, windows extend into gables, 1 over 1 or 2 over 2 double hung windows or casement windows, pointed or arched windows, oriel or bay windows, drip mold for window crowns, tracery at top of windows, paneled doors, elaborate or simple towers and turrets, clover-like foils, one-story entry or full width porch.

Greek Revival, 1825 - 1860: Symmetrical, gabled or hipped roof, entry porch or full width porch supported by square or round columns, central door with transom and sidelights, elaborate door surround or enframement, cornice with wide band of trim 6 over 6 double hung windows, three-part windows, window crowns or lintels.

[17] Reference: A Field Guide to American Houses, by Virginia Savage McAlester, Alfred A. Knopf, 2017.

Italianate, 1840-1885: Usually a low pitch hipped roof, sometimes front gable 2 or 3 stories, rarely 1 story, symmetrical or asymmetrical façade, groupings of windows, tall narrow arched or rectangular windows usually 1 over 1 or 2 over 2 double-hung sashes, one-story bay windows, window crowns hooded, bracketed or framed, half-glazed paired doors usually arched or rounded, square cupolas or towers, full-width porch or small entry porch, square columns or columns with brackets, wide overhanging eaves with decorative brackets.

Romanesque Revival, 1870—1900: Asymmetrical, hipped roofs with cross gables, masonry or stone walls usually with rough-faced or square stonework, sometimes polychromic stonework, polychromed slate roof, dormers, eyebrow, hipped and gabled rectangular windows, usually with stone transoms, rows of windows, usually deeply recessed, round-topped arches, towers usually round or square.

Queen Anne (1880-1910): Steeply pitched roof of irregular shape usually with a front facing gable, patterned shingles, cut-away bay windows, asymmetrical façade with partial or full-width porch usually one story high and extended along the side walls.

Colonial Revival, 1880—1955: Hipped or gabled roof, symmetrical or asymmetrical 2-stories, sometimes 1-story with a 1-story side wing, central entry door, paneled door with decorative crown supported by pilasters or columns, fanlights and sidelights, double-hung windows with multipane glazing in one or both sashes, paired windows, accentuated front entry sometimes with full-width porch or small portico.

Beaux-Arts (1885—1930): Symmetrical, 2+ stories, flat, hipped or mansard roof, masonry walls, Decorative details (quoins, pilasters or columns), decorative garlands, floral patterns and shields, pedimented and bracketed windows, roof balustrade, accentuated cornice.

Neoclassical (18905-1950): Façade dominated by full height porch with roof supported by classical columns. Columns usually with Ionic or Corinthian capitals, symmetrical balanced windows and center door.

Spanish Colonial Revival, late 19th century and early 20th century: Symmetrical or asymmetrical gabled, hipped or flat roof, multi-level roofs, overhanging eaves, stucco or adobe walls, usually red tile (barrel or flat) roof covering, mission shaped dormer or roof parapet, towers (round or square), quatrefoil window, arcaded entry porch, arches above windows and doors, balconies (open or roofed), decorative tiles.

Craftsman (1905-1930): Low pitched, gable roof (occasionally hipped)**,** unenclosed eave overhang, beams or braces under gables, full or partial-width porches with tapered columns.

International Style (1930s-1970s): Characterized by minimalist design, flat roofs, steel and glass construction, and a lack of ornamentation. Often seen in office buildings and institutional structures.

Design Guidelines General: Implementation of these guidelines is subject to the technical and financial feasibility of the recommendations. These design guidelines are limited in application

to the exterior front facades only of pre-1941 built infrastructure. These guidelines do not apply to side or rear building elevations; there are no special building materials or preservation measures required for side or rear building elevations under this program comment. These guidelines do not apply to buildings, structures, and landscapes constructed in 1941 and later. These guidelines do not apply to pre-1941 buildings, structures, and landscapes that are not eligible for listing in the National Register of Historic Places. Additional information is contained in the *Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings.*

Guidelines for Rehabilitation, Additions, Exterior Alterations, and Adjacent or Related Construction, and New and Replacement Construction

a. The appearance and character defining exterior front facade features of pre-1941 buildings and structures should be maintained to the maximum extent possible during these activities.
b. Exterior additions should be compatible with the mass, form, character-defining features, and general architectural style of the building. Ensure the size and scale of new additions in relationship to the building do not diminish, obscure or overwhelm the character of the historic building.
c. Additions should be placed in the rear and on secondary elevations to maintain the front façade and should be compatible with the scale, character-defining features, and architectural style of the associated buildings.
d. Where removal of exterior front façade character-defining historical materials or features is required, either in-kind or imitative substitute building materials may be used for replacement of removed or deteriorated or unsafe historic building materials.
e. Restoration of historic features that have previously been removed is not required.
f. New additions, exterior alterations, and adjacent or related construction should not destroy front façade features that characterize the property to the extent possible.
g. New additions and adjacent or related construction should be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property would be unimpaired.
h. New and replacement building construction should be compatible with the mass, form, character-defining features and general architectural style of the existing buildings and structures.
i. New compatible construction that occurs as infill within the existing pattern of development serves to preserve the historic character of the associated buildings and structures.
j. New and replacement building construction may accommodate additional square footage (i.e., square footage beyond that of the surrounding historic buildings) in the rear and on side elevations of the building. New and replacement construction should maintain compatibility of the front façade with the scale of surrounding historic buildings and structures.

Guidelines for Windows and Doors (Front facade only)

a. Maintain windows and their functional and decorative features including but not limited to the following: frames, sashes, muntins, sills, decorative jambs and moldings, hardware,

shutters and detail materials such as stained glass, beveled glass, textured glass or tracery to the extent possible. If windows and their functional and decorative features are failing or present a lead-based paint or other hazard, encapsulate, abate (such as dip-stripping), or replace with in-kind or imitative substitute building materials.

b. Maintain historic doors and their functional and decorative features including but not limited to the following: frames, panels, glazing, sidelights, fanlights, sur- rounds, thresholds, hardware and screen doors to the extent possible. If doors and their functional and decorative features present a lead-based paint or other hazard, encapsulate or replace with in-kind or imitative substitute building materials.
c. When an entire window or door requires replacement, it is appropriate to replace using imitative substitute materials where in-kind materials are not technically or financially feasible.
d. Awnings may be installed over windows and doors but should not obscure or damage the windows, doors, or other character-defining features.
e. Storm windows can be installed but should not obscure character defining features of the window. For example, if a window is a double-hung sash, install a storm window with a horizontal divider that matches the location of the divider on the existing window.
f. Storm doors can be installed so that they do not obscure or damage the existing door and frame. Select storm doors compatible with the color and character of the existing door.
g. If entirely new window openings or door openings are required, they should be installed on secondary elevations (rear elevation or elevations not visible from the street). The new windows should be compatible with, but not duplicate, the building's historic windows and fenestration to avoid creating a false historical appearance.
h. Windows or doors that have to be covered for security and other purposes should be locked, cleaned, and covered on the exterior or interior rather than infilled with a permanent material such as brick or concrete, where security requirements allow.

Guidelines for Entrances, Porches and Details (Front facade only)

a. Maintain historic front façade entrances, porches and their functional and decorative features including columns, pilasters, piers, entablatures, sidelights, transoms, steps/stairs, railings, floors and ceilings.
b. Maintain and repair historic front façade entrances, porches and their features through appropriate methods. If repair or replacement of historical materials presenting a lead-based paint or other hazard is required, encapsulate, or replace with in-kind or imitative substitute building materials.
c. If a portion of an entrance, porch or feature is deteriorated beyond repair or presents a lead-based paint or other hazard, it is appropriate to replace using imitative substitute materials where in-kind materials are not technically or financially feasible.
d. If replacement of an entire entrance, porch or feature is necessary, it is appropriate to replace using imitative substitute materials where in-kind materials are not technically or financially feasible.
e. It is inappropriate to enclose a historic front or primary entrance or porch. If enclosure of a historic entrance or porch on a secondary elevation is necessary, design the enclosure to maintain the historic character of the entrance. For instance, recess the enclosure behind

columns, balustrades and other features and/or consider using glass instead of solid materials.

Guidelines for Roofs

a. Maintain historic roof coverings, functional and decorative features (including but not limited to cresting, dormers and chimneys) whenever possible.
b. Protect and maintain roofing materials through regular maintenance using appropriate methods, including removal of debris from roofs and cleaning and maintenance of gutter systems.
c. If a portion of a historic roof covering or feature is deteriorated beyond repair, it is appropriate to replace using imitative substitute materials where in-kind materials are not technically or financially feasible, less durable, or are less climate resilient.
d. If replacement of an entire historic roof covering or feature is needed, it is appropriate to replace using imitative substitute materials where in-kind materials are not technically or financially feasible. If a historic roof has already been replaced with modern materials, modern material should continue to be used in future replacements.
e. Gutter systems should be compatible with the historic character of the building and/or historic district. In-kind or imitative substitute gutter materials may be used and should avoid concealing other architectural features to the extent possible. If replacement of gutters is needed, it is appropriate to replace using imitative substitute materials where in-kind materials are not technically or financially feasible.
f. Non-functional concealed, built-in gutter systems may be repaired with in-kind or replaced with modern exposed gutters similar to others in common use within the neighborhood or historic district. Installation of exposed gutters should avoid concealing other architectural features to the maximum extent possible.
g. It is inappropriate to apply new features (such as balustrades, cupolas and cresting) where none currently exist. Restoration of missing historic features or historic roofing materials is not required.
h. New roof features such as skylights, vents, solar panels, antennas, satellite dishes and mechanical equipment should be installed in areas not visible from the street if possible.
i. Dormers and additions to roofs should be compatible with the character of the building in size, design and scale, and should be located in areas not visible from the street if possible.
j. It is inappropriate to use temporary measures long term, such as exposed tarpaper as a finished roofing material. In addition, tar or asphalt products should not be used to patch clay tiles, slate, wood or metal roofs. In-kind or imitative substitute materials may be used as patch treatment.
k. If historic roofing material has previously been replaced with a different material, i.e., if a slate, wood shingle, or clay tile roof has been replaced at some point in time with asphalt shingles, it is permissible to re-roof with asphalt shingles, i.e., with the modern building materials.

Guidelines for Foundations and Walls (Front facade only)

a. Maintain historic foundations and exterior front facade walls that contribute to the historic character of a building, including their functional and decorative features such as cornices, bays, piers and pediments.
b. Maintain and repair materials, details and features of foundations and front facade exterior walls through appropriate industry standard methods.
c. If a portion of a foundation, exterior wall or feature is deteriorated beyond repair, replace with in-kind or imitative substitute building materials.
d. If replacement of an entire foundation, exterior wall, or feature is necessary, replace with in-kind or imitative substitute building materials.
e. It is generally inappropriate to introduce new features such as windows, doors, and vents to front facade exterior walls. If new features are required, features should be installed on secondary elevations (rear or side elevations, or elevations that are not visible from the street) whenever possible.
f. When required, it is appropriate to remove and replace exterior wall materials or features including but not limited to panels, pediments, bargeboard and cornices with in-kind or imitative substitute building materials.
g. In-kind or imitative substitute materials may be used on front facade exterior walls. Imitative substitute materials should simulate the dimensions and finish of the historical building materials.

Guidelines for Historic Designed Landscapes and Features (Applicable only to designed landscapes in cantonment area historic districts)

a. Maintain features of historic designed landscapes to the extent possible including but not limited to the relationship and spatial arrangement of the various components of the landscape, water features, circulation patterns, topography, vegetation, structures, site furnishings and objects. Avoid removing, obscuring or concealing such historic landscape features to the extent possible.
b. Maintain historic designed landscape features including fountains, sculpture, site and street furnishings, monuments and gravestones, walkways, sidewalks, fences, walls, and hills, trenches and terraces to the extent possible. If all or a portion of a historic designed landscape feature requires replacement, it is appropriate to replace with in-kind materials or with imitative substitute building materials. Recreation of designed landscape features is not required.
c. Installation of new fencing where none currently exists is allowed. Installation of new fencing or replacement of existing fencing is not subject to any specific design requirements or other criteria considering it is impermanent and removable. Repair and replace existing historic fencing with in-kind materials or imitative substitute building materials if financially and technically feasible.
d. Maintain historic plant materials through appropriate methods to the extent possible. If replacement of historic plant materials is necessary, replace with the same or similar species where possible and practicable, or with selections from an installation's approved plant material list (if such a list is available). Removal of historic trees and other plant materials may occur where necessary.

e. If a portion of a historic landscape feature is deteriorated beyond repair, replace the damaged portion using in-kind historical materials or imitative substitute building materials, if financially or otherwise feasible.
f. Replacement of a documented historic landscape feature that is not currently existing is not required.

Guidelines for Historic Districts

a. Maintain character defining views and view sheds into and out of historic buildings and historic districts including scenic vistas and open space to the extent possible.
b. Retain the historic community plan of historic districts including but not limited to cultural or man-made features such as circulation systems, streetscapes and furnishings, designed landscapes, setbacks, and monuments and statues, as well as the natural features such as open space, wooded areas, rivers and landforms, to the extent possible.
c. Solar panel and freestanding solar arrays and other energy related features and elements are acceptable within historic districts.

Guidelines for Circulation Systems and Paving Patterns

a. Maintain character defining circulation patterns including but not limited to streets, sidewalks, alleyways, driveways, bridges and green space along with their features such as curbing, surface materials, orientation, and landscaping, to the extent possible.
b. Maintain historic planting strips between the sidewalk and street as well as medians, and avoid paving over existing planting strips or medians, to the extent possible.
c. If a portion of a historic circulation or paving pattern or feature is deteriorated, replacement with in-kind or imitative substitute building materials is appropriate.
d. Repaving existing paved streets, sidewalks, alleyways, driveways, and bridges is not subject to any specific design requirements or other criteria.

Guidelines for Force Protection

a. Comply with force protection standards in a manner that maintains character-defining exterior building features on the front facade to the extent possible.
b. Install force protection systems and equipment such as security systems, cameras and surveillance equipment, lighting and other equipment in a manner that maintains character-defining features and materials to the extent possible.
c. If possible, locate small components of sensor and surveillance technologies under building eaves or inside light fixtures to minimize the impact to the historic fabric and visual impact of a building, district and associated buildings and structures, and landscape features.
d. To the extent possible, locate ventilation equipment or other force protection utilities on inconspicuous elevations, such as on the side or rear facade, to limit the visibility and, if possible, screen from view utilizing landscaping, fences or walls appropriate to the character of the historic building and/or district.

e. If possible, install new force protection measures such as security bars, grilles, and ventilation equipment in a reversible manner so that the system can be removed in the future with minimal damage to the historic building.
f. All interior alternations proceed as required by mission needs without restriction.

Guidelines for Routine Maintenance

a. Routinely inspect the roof to ensure it is weather tight. Missing roofing materials should be replaced, and holes repaired according to methods in these guidelines. In-kind or imitative substitute building materials may be used for replacement and repairs.
b. Routinely inspect walls and foundations for insect and vermin infestation, moisture, cracks, deterioration and settlement. If problems occur, repair according to methods in these guidelines.
c. Routinely inspect the windows and doors to make sure they are operable and sealed properly to prevent water intrusion.
d. Routinely inspect potential points for water intrusion such as crawl space openings, foundations and basement windows to make sure water is being diverted away from the building.
e. Routinely inspect potential points for moisture intrusion such as masonry wicking in moisture, and condensation from poorly ventilated attics.
f. Gutter systems should be routinely cleaned and inspected to ensure they discharge water away from the building and do not leak.
g. Ensure that painted surfaces have a sound non-lead-based paint film, including but not limited to the following: walls, windows, doors, and architectural details.
h. Avoid painting or sealing unpainted masonry, glass or metal surfaces since this could accelerate deterioration.
i. Repair loose architectural features including but not limited to the following: brackets, rafters, pediments, cornices, balustrades, shutters, storm windows and doors, and siding, to the maximum extent possible.
j. Repair damaged structural features, such as masonry settling, eaves and porch posts in a timely manner before further structural damage occurs.
k. Vegetation around the historic property should be maintained and pruned back from the walls and foundations at least 12 inches. Remove ivy or other vegetation from walls and remove overhanging tree limbs and branches.
l. Remove trees and other vegetation when necessary to prevent gutter clogging, drainage issues, damage to infrastructure, or for safety purposes.
m. Mechanical, electrical and plumbing systems should be routinely inspected to make sure they are operating efficiency and correctly.

Guidelines for Emergency Repairs and Disasters

a. It is appropriate to make temporary emergency repairs to pre-1941 buildings. The repairs should be done in a manner that will cause minimal harm to the front facade of the historic building if possible. Appropriate temporary repairs include the use of tarpaulins, plywood and bracing timbers to stabilize and secure the building. Make permanent repairs as soon as possible.

b. Remove standing water from basements and crawl spaces; however, ensure that pumping water will not collapse foundations when groundwater is high.
c. Remove all water-soaked materials including insulation, wall- board and wall coverings.
d. Air dry the building with ventilation. Avoid systems that pump in super-dry air.
e. Remove debris from and around the historic property including damaged trees and overhanging tree limbs.
f. Remove loose and damaged plaster, replacement of plaster with drywall is acceptable.

Guidelines for Mothballing Buildings

a. Ensure that roofs are weather tight by replacing missing shingles or tiles and repair openings in an accept- able method. In-kind or imitative substitutive building materials may be used for missing roofing materials.
b. Gutters should be cleaned and inspected to ensure they do not leak and that they discharge water away from the building. Additionally, potential points of water intrusion such as basement windows and crawlspaces should be inspected and blocked to divert water away from the building.
c. Walls and foundation should be inspected for deterioration and damage. Make appropriate repairs to prevent moisture and water penetration This includes repointing of masonry surfaces and repainting of wood siding.
d. Entry points should be sealed by closing door and window openings using infill materials such as plywood, corrugated panels and metal grates or grilles. The installation of infill materials should not damage door and window openings and associated building features such as sashes, doors and frames.
e. Exterior doors should be reinforced and secured. If the historic doors would be damaged by adding reinforcement, temporarily remove the doors and replace with secure modern doors. Store historic doors on site for reuse if possible.
f. Shut off water utilities to the building and drain the pipes.
g. If the building has monitoring and alarm devices such as fire suppression systems, fire alarms and security alarms, they should remain operational, especially functional sprinkler systems.
h. Disconnect all electrical systems not necessary for security, fire prevention and/or ventilation.
i. Loose architectural and structural features such as brackets, porch posts, balustrades and mantels should be repaired. If repair is not feasible, document, and remove the features. Inventory and store the features in a manner that prevents deterioration if the features can be reused.
j. Pest infestation should be exterminated and properly seal off their access to the building, which includes properly screening chimneys, vents, grills and louvers with a heavy-duty wire mesh and termite treatments.
k. The building should be adequately ventilated. This will vary depending on the building, the climate and the building's freeze-thaw cycle. Solutions range from the covering of small openings with heavy duty wire mesh to forced air ventilation in humid climates.

Appendix D. Building Materials Guidelines, Selection Procedure, and Catalog for Pre-1941 Buildings

This appendix provides a standard procedure for building materials selection, building materials guidance, and a catalog for the selection of appropriate building materials for implementation of management actions on the exterior front facades of pre-1941 buildings. Catalog entries are provided for major components of the building design. Design considerations for each entry are derived from the design fundamentals of scale, mass, proportion, and materials to develop guidance for materials and component design that factor location, type, size, finish, and maintenance in their selection. Emphasis is placed on retention of the design integrity of the front facade.

Building Materials Selection Procedure for Exteriors:

For exterior management actions affecting the exterior front facade of pre-1941 built infrastructure, the following procedure is implemented by Army installations to select appropriate building materials.

(a) Assess the historic building material in terms of condition, design, material, performance, safety, and presence of hazards such as lead-based paint, asbestos, and other hazardous materials or conditions;

(b) Determine if historic building materials can be repaired or if they should be replaced due to technical and financial feasibility factors, or presence of hazards. Consider health and safety factors, and availability of historic materials and skilled craftsmen required for their application.

(c) If replacement of historic materials is required, determine if there are material characteristics of the historic building materials that should be improved upon;

(d) Identify potential in-kind building materials and substitute building materials with reference to Appendix C and Appendix D. Compile a short list of potential in-kind building materials and/or substitute building materials;

(e) Determine the technical feasibility of the potential in-kind and substitute materials;

(f) Determine the financial feasibility of the potential in-kind and substitute materials; and

(g) Select and use the appropriate in-kind building material or substitute building material in consideration of technical and financial feasibility.

Building Materials Catalog Entries:

Foundations

The *Design Guidelines* support the repair and maintenance of historic materials used in foundations, when appropriate. In cases where replacement of foundation materials is desirable or necessary, either the in-kind replacement of historic materials or the installation of imitative substitute materials that simulate the size and finish of the historic building material are approaches authorized under the *Design Guidelines*.

Building foundations are the structural systems that support buildings. For the purposes of application of the *Design Guidelines,* foundations are limited to the elements of the foundation system that are visible at the base of a dwelling. These elements include exterior foundation cladding, piers, bulkheads, windows, and water tables.

The following discussion of treatments appropriate to the replacement of deteriorated foundations applying the *Design Guidelines* is based on a three-step process: 1) Identify existing and/or historic application; 2) Identify design considerations of location, type, size, finish, and design maintenance to be factored in the replacement as appropriate to the requirements of the project; and 3) Select in-kind or imitative substitute materials meeting the design considerations and *Design Guidelines*.

Historic Use - Army foundation systems are generally excavated systems. Exposed foundation walls typically found in include concrete, brick, stone, and stucco.

Design Considerations: Five major factors should be considered in the selection of in-kind and imitative substitute materials simulating exposed foundation materials and design elements: location, type, size, finish, and design maintenance. Consideration of these factors will support retention of the overall design integrity of the building and the associated historic district:

Location: The historic location and visibility of the work may be considerations in exterior foundation projects. Consider repair and/or replacement approaches that maintain the amount of foundation historically visible, particularly on elevations with the greatest prominence within the historic area. Select materials that simulate the historic foundation cladding type, when possible. The location of foundation features, such as bulkheads, windows and window wells, and exterior doors, should be retained, when possible, to maintain the design of the building and the pattern established by the design of the area. Consider the location of necessary mechanical systems adjacent to secondary or rear elevations.

Type: Retain or simulate the type and materials of the historic foundation when possible. Consider design strategies that may visually maintain the appearance of the original foundation type should foundation alteration prove necessary. Consider the integration of new facing finishes, such as stone and brick that match historic stone and brick in type in foundation projects. Consider the composition of historic concrete and stucco, which effects the material's visual character as well as permeability, density, and compressive strength. For example, concrete is composed of three ingredients: water, aggregate, and cement. Aggregate constitutes

the majority of the concrete mix, up to 80 per cent by volume, and can be fine or course, ranging from sand to stone. Composition affects the visual characteristics of concrete. Consider matching those visual characteristics, when possible.

Size: Consider simulating the historic proportions of individual facing units and the height of the historically exposed foundation. For example, brick units should be repaired and/or replaced with units that simulate the width, length, and depth and coursing of the historic brick. Similar approaches should be considered in the selection of stone veneers, as possible.

Finish: Masonry, concrete, and stucco are materials that can be parged with a finish coat, painted, or left in their natural state. Simulating the color, texture, and reflective quality of the historic finish is recommended, when possible. Texture, such as rusticated or smooth finishes, can be the result of the manufacturing process or added during installation. Consider finishes that are comparable in color and type of finish with both the historic building design and with the surrounding historic district, where possible. In projects involving selective repair to exterior foundation walls, test patches of materials on less visible, secondary elevations should be considered, when possible, to assure their acceptability in the overall building design. Consider compatible mortar composition when repairing or replacing damaged mortar.

Design Maintenance: Foundations are vulnerable to moisture and structural or seismic movement. Cracking, spalling, water staining, mold, and unwanted vegetation can be symptoms of conditions that may affect the life expectancy of foundation projects and may compromise the appearance of the work over time. Water infiltration often is a contributing factor to appearance. Consider monitoring gutters, downspouts, flashing, and sprinklers regularly to encourage drainage away from the building to extend the installation appearance of foundation repairs and/or replacements.

Recommended Materials:

In-kind Repair and / or Replacement: In-kind replacement and repair of foundations is a treatment option identified in the *Design Guidelines*. In-kind replacement of historic materials should be consistent with the *Design Guidelines* and design considerations identified for the element. Additional guidance is contained in the *Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings*. Detailed guidance on in-kind repair and replacement of historic materials has been developed by the National Park Service in their *Preservation Briefs* series. *Preservation Brief 15 Preservation of Historic Concrete* and *Preservation Brief 22 The Preservation and Repair of Historic Stucco* particularly may be relevant to foundation projects.

Imitative Substitute Materials: Imitative substitute materials for repair and / or replacement of existing building components is a treatment option allowable under the *Design Guidelines* provided that the imitative materials are consistent with the *Design Guidelines* and consistent with the design considerations identified for the building element. Further guidance can be found in *Preservation Brief 16: The Use of Substitute Materials on Historic Exteriors.*

The following list provides examples of imitative substitute materials. This list is not intended to be comprehensive and is limited to the most common types of imitative substitute materials

currently available. New materials and building products may be introduced in the future that meet the *Design Guidelines* and design considerations.

Manufactured Stone Veneer	Also known as architectural stone or veneer stone, manufactured stone veneer is an engineered product intended to look like natural stone. It is composed of a mixture of Portland cement, iron oxides, and aggregates. Manufactured stone veneer is light, uniform, and widely available. However, the color can fade over time and veneers are often brittle.
Veneer	Veneer is a thin layer of natural stone or brick typically applied over masonry or non-masonry surfaces. It is a durable product that often is less expensive than structural brick and stone.
Acrylic Stucco	Acrylic stucco, a synthetic stucco, is composed of acrylic resins and polymers. The material is designed to be applied over masonry or cement to replicate the texture and appearance of stucco. It is water-repellent, elastic, flexible, and durable. It is not prone to hair-line cracks or flaking. Acrylic stucco is produced with a variety of aggregates and custom textures. Acrylic stucco is produced with a range of colors and can be painted. Similar to traditional stucco, finish coats can be added. Acrylic stucco generally is more expensive than traditional, concrete-based stuccos. Acrylic stucco generally is not recommended for spot-repairs to historic stucco due to materials compatibility and aesthetic differences over time as materials age.
Masonry Block/Precast Stone	Precast stone, also known as masonry block, is a concrete product that is manufactured to simulate the appearance of natural stone. It can be customized to simulate the size and finish of historic units.
Precast Concrete Slab	Precast concrete slabs are molded concrete slabs, and in ideal conditions, fabricated off-site. The resulting product typically is stronger than slabs cast onsite because of variables such as weather and temperature. Precast slabs easily are installed and eliminate many labor costs associated with pouring concrete onsite.

Exterior Wood Cladding (Siding, Shakes, and Shingles)

The *Design Guidelines* support the repair and maintenance of historic materials used in exterior front facade wall claddings, when appropriate. In cases where replacement of front facade exterior wall cladding is desirable or necessary, either the in-kind replacement of historic materials or the installation of imitative substitute materials that simulate the size, design, and finish of the historic building material are approaches authorized under the *Design Guidelines*.

The following discussion of treatments appropriate to the replacement of deteriorated exterior front facade wood cladding applying the *Design Guidelines* is based on a three-step process: 1) Identify existing and/or historic application; 2) Identify design considerations of location, type, size, finish, and design maintenance to be factored in the replacement as appropriate to the requirements of the project; and 3) Select in-kind or imitative substitute materials meeting the design considerations and Design Guidelines.

Historic Use: Exterior wooden claddings were used in historic Army buildings the as a primary wall material and as claddings for support structures, such as garages.

Board Cladding: Wooden board cladding visually is defined by milling and installation. Wood siding can feature smooth or rusticated textures; the size and width of the boards can vary greatly. Frequently wood siding is painted or stained. Typical fabrication and characteristics include Tongue-and Groove (Flush and interlocked), Clapboard / beveled (thicker on one edge), and Board-and-batten (Vertical planks with narrower planks, battens, placed over the seams).

Shingles: Visually, shingles and shakes are differentiated through the method used to produce them. Shingles should not be replaced with units that are visually shakes and vice-versa. Shingles are smooth and sawn on both sides; finish of drop edge may be straight or curved. Shakes are sawn on one side, rough on one side.

Design Considerations: Five major factors should be considered in the selection of in-kind or imitative substitute materials simulating exterior wood cladding: location, type, size, finish, and design maintenance. Consideration of these factors will support retention of the overall design integrity of the building and the associated historic district:

Location: The historic use of wood siding in the overall building design and the visibility of the proposed work may be considerations in wood cladding replacement.

Type: Cladding type often results in distinctive wall appearance. For example, drop siding features short runs of overlapping boards, tongue-and-groove siding comprises inter-connecting units that create a smooth surface, overlapping shingles create irregular wall textures. Replacement materials should be selected to simulate the type of historic cladding and to simulate the historic exterior front façade wall appearance.

Size: The dimensions of the cladding type also are factors in the appearance of the exterior front façade wall. Replacement cladding should approximate the overall height, width, and depth of the existing or historic fabric as closely as possible.

Finish: Pigment medium, texture, and reflective quality of finishes to exterior wood cladding can contribute to the visual character of the exterior building design and the historic district. Pigment mediums, including paint and stains, used in replacement should simulate the finish medium, texture, and reflective quality of the existing or historic materials, where possible. The selection of paint or stain color should consider compatibility with the historic area. However, it is not necessary to utilize original colors that may have been determined through a chemical paint

analysis. Elastomeric paints are designed to protect masonry surfaces and not appropriate for wooden elements.

Design Maintenance: The character of in-kind materials and imitative materials also may differ over time as the materials age. Selective replacement of deteriorated wooden cladding using imitative substitute materials may become more apparent with time. Consider replacement strategies that limit or avoid the potential of unintended impacts to design integrity, when possible.

Recommended Materials:

In-kind Repair and / or Replacement: In-kind replacement of front facade wood cladding is a treatment approach identified in the Design Guidelines. In-kind replacement of historic materials should be consistent with the Design Guidelines and design considerations identified for the element. Wood siding continues to be produced and is widely available. Additional guidance is contained in the *Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings*. Detailed guidance on in-kind repair and replacement of historic materials has been developed by the National Park Service in their *Preservation Briefs* series. *Preservation Brief 47 Maintaining the Exterior of Small and Medium Size Historic Buildings* particularly may be relevant to wood cladding.

Imitative Substitute Materials: Replacement of front facade wood cladding with cladding fabricated in imitative substitute materials is an allowable treatment approach provided that the imitative substitute material meets the Design Guidelines and design considerations. Further guidance on material selection and installation can be found in *Preservation Brief 16 The Use of Substitute Materials on Historic Exteriors* and *Preservation Brief 8 Aluminum and Vinyl Siding on Historic Buildings: The Appropriateness of Substitute Materials for Resurfacing Historic Wood Frame Buildings.* The following list provides examples of imitative substitute materials for wood siding. Using substitute sidings like aluminum or vinyl can diminish the historic character by covering or removing distinctive features, such as trim, and altering the building's texture and shadow lines. For NHLs, vinyl siding is an acceptable substitute material when existing cladding material is deteriorated beyond repair, or if there is a hazard such as lead-based paint that should be encapsulated.

Cellular Composite	Cellular composite siding is a comparatively new product on the market. Available for residential use for approximately a decade, it utilizes an interlocking installation system. The product is currently manufactured by less than five manufacturers; and, there is limited performance data on its durability over time.
Engineered Wood	Engineered wood is composed of compressed resin and wood chips. Generally, it is treated to protect against rot and termites; it does not rot. Additionally, it performs well under most weather conditions. The siding requires maintenance and painting.

Fiber Cement / Cementitious	Fiber cement is a cementitious material composed of cement, sand, water, and fiber. It is significantly heavier than other siding options making installation more difficult. Fiber cement requires periodic caulking between joints. Fiber cement can be textured to simulate natural wood and is generally factory finished. The material can be susceptible to chipping. It must be repainted approximately every 15 years.
Metal	Aluminum siding is light and easy to install. Aluminum siding requires regular maintenance and is prone to damage, denting, melting, warping, and expansion and contraction. Steel siding is considerably more durable, but heavier than its aluminum counterpart. Steel siding is susceptible to rust as well as similar damage as aluminum.
Vinyl	Vinyl is the most common imitative wood siding. It primarily is composed of polyvinyl chloride (PVC) resin. Vinyl is water resistant rather than waterproof and is subject to expansion and contraction with seasonal temperature changes. The benefits of vinyl are its wide availability, low price, versatility of color, texture, and size, familiarity, low maintenance, infrequent cleaning, and ease of installation. May be affected by extreme heat or cold.
Wood Composite	Wood composite is an innovative and environmentally friendly product. Composite typically is fabricated from a mixture of wood fiber, recycled plastic, and a binder. The materials are significantly lighter than wood; replicate wood grain, color or stain, and milling; and come in varying sizes and widths.

Exterior Masonry

The *Design Guidelines* support the repair and maintenance of historic materials used in exterior wall claddings, when appropriate. In cases where replacement of exterior front facade wall cladding is desirable or necessary, either the in-kind replacement of historic materials or the installation of imitative substitute materials that simulate the size and finish of the historic building material are approaches authorized under the *Design Guidelines*.

The following discussion of treatments appropriate to the replacement of deteriorated exterior front facade masonry cladding applying the *Design Guidelines* is based on a three-step process: 1) Identify existing and/or historic application; 2) Identify design considerations of location, type, size, finish, and design maintenance to be factored in the replacement as appropriate to the requirements of the project; and 3) Select in-kind or imitative substitute materials meeting the design considerations and *Design Guidelines*.

Historic Use: Historic masonry, defined in this section as brick, stone, and adobe typically was sourced locally during the Inter-War period. Masonry is composed of the masonry unit and the mortar and extends to all elevations. Generally, masonry is unpainted and can feature quoins and water tables. Early stone masonry construction typically was solid, but stone veneer also can be present in some buildings. It commonly is rubble arranged in courses. Brick masonry typically features extruded brick with consistent composition and firing resulting in uniform units. The use of adobe brick is typically limited to buildings in the southwest and includes site manufactured or commercial cast unstabilized adobe brick.

Design Considerations: Five major factors are suggested for consideration in the selection of in-kind historic materials or imitative substitute materials simulating exterior masonry cladding: location, type, size, finish, and design maintenance. Consideration of these factors will support maintenance of the overall historical and architectural character integrity of the building and the associated historic district, as appropriate:

Location: Exterior masonry can be a dominant design characteristic of dwellings and associated residential neighborhoods. Masonry frequently establishes the color palette and architectural rhythm of an area through standardized materials and standardized construction techniques. Consider the visibility of proposed improvements to both the building and to the area, as appropriate. Particular attention should be paid to the existing design of primary elevations and those elevations with the greatest prominence. Maintain existing patterns of structural bays, where possible. Limit new masonry work to areas historically containing exposed masonry, as possible.

Type: Consider matching the appearance of front façade historic masonry as closely as possible. Replace brick with brick and stone with stone. Consider the source and characteristics of the historic material, where possible. Local clay mixes often produced standardized bricks in distinctive colors due to their chemical composition. Simulating historic stone type in replacement projects often is aesthetically desirable in executing repair, replacement, or additions to masonry buildings. Consider simulating the method of installation as well as the type of masonry unit. Coursing type generally refers to how the stone or brick units are laid in a wall. Typically, stone masonry can be coursed or uncoursed ashlar or rubble. Stone historically was laid either in organized rows or courses; or laid in a random pattern. Each technique resulted in a unique wall pattern, which should be matched when possible. Bricks are laid in courses as either stretchers (lengthwise) or headers (widthwise). These courses are described as the brick bond. The most common bonds are running (all stretchers), common (running bond with intermittent courses of headers), and Flemish (alternating stretchers and headers). Brick bonds are decorative as well as structural. Brick bonding patterns are features of the historic wall that should be matched, if possible. Also consider simulating the mortar type, width, and profile of mortar joints uniting historic masonry units in the overall wall, as appropriate. Matching mortar type can prevent further damage by utilizing a compatible material. The type and size of mortar joint used in a masonry wall often is a design as well as a structural feature. Matching mortar profiles in projects, such as selective repointing, can contribute to projects that blend with the original wall.

Size: Consider the dimensions of the historic masonry units in repair and replacement projects. Replacement masonry should approximate the overall height, width, and depth of the existing units as closely as possible. Replacement that strives to replicate the dimensions of historic masonry units, where possible, will contribute to the preservation of the overall design integrity of the individual building as well as maintain consistency within the historic district.

Finish: Pigment medium, texture, and reflective quality of finishes of masonry cladding can contribute to the visual character of the exterior building design and the historic district. Mortar and masonry units have different finishes, both of which should be simulated, when repair or replacement become necessary. Wet, dried, and cured mortar produce different colors. Mortar joints, or the application or shape, may be concave, flush, beaded, weathered, extruded, vee, or raked. The color of brick is determined by the material and chemical compounds of which they are composed. Most commonly red bricks made primarily of sand, clay, and iron oxide are used in construction. Additionally, differently colored masonry units typically are used on the same building to create visual interest. Color can be used as a decorative element that is integral to the appearance of the building. Stone naturally occurs. The color can be specific to the quarry from where it was mined. However, typically, there is color variation within stones used on buildings. Additionally, buildings can be constructed with a range or selection of stone colors used with varying frequencies. Identify the color variation of masonry units and mortar before selecting in-kind or imitative substitute units that match historical patterns as closely as possible.
Design Maintenance: Historic masonry that is maintained in place should be repaired, replaced, and cleaned using methods that follow preservation guidance found in *The Secretary of the Interior's Standards for the Treatment of Historic Properties* and *Preservation Brief 2 Repointing Mortar Joints in Historic Masonry Buildings*. Matching historic walls in selective wall repair using imitative substitute masonry may pose challenges. Such challenges often lead to recladding full elevations. Consider how new in-kind and imitative substitute material will age over time. Differences between new and historic materials as they age can make acceptable finished work more obvious over time.

Recommended Materials:

In-kind Repair and / or Replacement: In-kind replacement of exterior front facade masonry is a treatment approach identified in the *Design Guidelines*. In-kind replacement of historic materials should be consistent with the *Design Guidelines* and design considerations identified for the element. Additional guidance is contained in the *Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings*. Detailed guidance on in-kind repair and replacement of historic materials has been developed by the National Park Service in their *Preservation Briefs* series. *Preservation Brief 2 Repointing Mortar Joints in Historic Masonry Buildings* and *Preservation Brief 5 Preservation of Historic Adobe Buildings* are relevant to exterior masonry projects.

Imitative Substitute Materials: Replacement of exterior front facade masonry with cladding fabricated in imitative substitute materials is an allowable treatment approach provided that the imitative substitute material meets the *Design Guidelines* and design considerations. Further guidance can be found in *Preservation Brief 16 The Use of Substitute Materials on Historic Exteriors.* The following list provides examples of imitative substitute materials for masonry

siding. However, there are limited imitative options available. Brick still is produced widely; stone also remains available. Please note that the list of materials is anticipated to expand as new materials and products are developed and become available.

Manufactured Stone Veneer	Also known as architectural stone or veneer stone, manufactured stone veneer is an engineered product intended to look like its natural counterpart. It is composed of a mixture of Portland cement, iron oxides, and aggregates. It is light, uniform, and widely available. However, the color may fade over time and the product is brittle.
Veneer	Veneer is a thin layer of natural stone, brick, or adobe bricks typically applied over a masonry or non-masonry surface. It is a durable product. Additionally, it is less expensive than brick, stone, or adobe.
Precast Stone, Stabilized adobe brick, Compressed adobe brick	Precast stone is a concrete product that is manufactured to simulate the appearance of natural stone. It can be customized to simulate the size and finish of historic units. Manufactured stabilized adobe brick is made from a mixture of water, coarse and fine sands, silt, clay and straw or animal hair as well as a stabilizing additive to provide extra protection against moisture and/or erosion and is used in lieu of unstabilized adobe brick. Compressed (or pressed) adobe brick is brick that has been mechanically pressed during manufacture. Caution should be exercised with the use of compressed adobe brick in the repair of buildings with unstabilized adobe brick. The high expansion rate of compressed bricks may lead to damage of unstabilized adobe brick.

Stucco Cladding

The *Design Guidelines* support the repair and maintenance of historic materials used in exterior wall claddings, when appropriate. In cases where replacement of exterior front facade wall claddings is desirable or necessary, either the in-kind replacement of historic materials or the installation of imitative substitute materials that simulate the size and finish of the historic building material, are approaches authorized under the *Design Guidelines*.

The following discussion of treatments appropriate to the replacement of deteriorated exterior front facade stucco cladding applying the *Design Guidelines* is based on a three-step process: 1) Identify existing and/or historic application; 2) Identify design considerations of location, type, size, finish, and design maintenance to be factored in the replacement as appropriate to the requirements of the project; and 3) Select in-kind or imitative substitute materials meeting the design considerations and *Design Guidelines*.

Historic Use: Stucco is composed of a mix of mud, clay, lime, chalk, cement, and gravel. The composition of stucco can be unique to the building to which it is applied. Historically, stucco is applied in layers directly onto a substrate such as structural tile or masonry in stucco walls and foundations. Stucco also was applied over wood or metal lath. Stucco acts as a sealant for the building envelope, and when applied correctly and maintained, protects against wind and water damage. The material is fire resistant. Stucco siding was utilized as a finish limited to single stories in multi-story dwelling and applied as a cladding for the entire building envelope.

Design Considerations: Five major factors should be considered in the selection of in-kind or imitative substitute materials simulating exterior stucco cladding: location, type, size, finish, and design maintenance. Consideration of these factors will support retention of the overall design integrity of the building front facade and the associated historic district.

Location: Stucco exterior finishes often are character-defining design features. Consider maintaining front facade of a building exterior that historically were finished in stucco with in-kind historic materials or with imitative substitute materials that will maintain the original design. Avoid the installation of stucco in areas where it was not historically used, when possible.

Type: Consider the composition of the historic stucco when repairing or installing imitative materials, as appropriate. Repairs using incompatible material may fail and can be visible despite appropriate installation. Consider consulting historic construction documents for historic stucco composition, when available. Composition also may be determined through the analysis of existing stucco.

Size: Stucco can include a fine or coarse grain substrate, which determine its texture. Fine-grain substrate results in a more plaster-like texture, while a courser grain results in a rougher finish. Consider matching existing stucco texture when consistent finish surfaces are desired.

Finish: Stucco finish coats and / or paint were applied to achieve the finish and color of the exterior surface. Consider simulating historic finishes, where possible. Historic stucco typically comprised three layers: the scratch, brown, and finish coats. Modern stucco generally is limited to one or two coats applied over fiber-reinforced stucco. The finish, top, coat provides the texture of the final stucco. Finish coats are determined by the tools used in application and can range from smooth to rusticated surfaces. Consider simulation of the historic finish in repair and/or replacement projects to achieve visual cohesion of the building's surface and within finishes found in the associated historic district.

Design Maintenance: Consider maintenance of existing stucco finishes using methods suggested in the *Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings* and *Preservation Brief 22: The Preservation and Repair of Stucco*, when in-kind materials are project treatment options. Imitative substitute stucco materials include both "systems," such as multi-layer boards with a stucco-textured finish, and synthetic stucco. These imitative substitute materials generally are designed as whole-wall treatments for new wall construction. Matching existing wall appearance and imitative substitute materials can be challenging and differences between historic and imitative substitute materials may become visually obvious over time as the

materials age. Consider finish coats or the addition of paint films to unify the aesthetic appearance of the wall, as appropriate.

Recommended Materials**:**

In-Kind Repair and / or Replacement: In-kind replacement of front facade stucco cladding is a treatment approach identified in the *Design Guidelines.* In-kind replacement of historic materials should be consistent with the *Design Guidelines* and design considerations identified for the element. Additional guidance is contained in the *Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings*. Detailed guidance on in-kind repair and replacement of historic materials has been developed by the National Park Service in their *Preservation Briefs* series. *Preservation Brief 22 The Preservation and Repair of Historic Stucco* particularly may be relevant to exterior stucco projects. After 1900, most stucco in the United States was composed of Portland cement and lime (now gypsum). During the pre-1941 period, the typical stucco mix included: one-part Portland cement, two-and-a-half parts sand, lime totaling less than 15 per cent of the cement's volume, and enough water to make the mix workable. Generally, repair or replacement projects are limited to the area of damage. The root cause of damaged stucco typically is water infiltration or building movement. Damage and deterioration will continue to occur if water infiltration is not stopped. Monitor gutters and downspouts to assure that water is draining away from the surface of the building and that sprinklers and other watering systems are not spraying the building. These efforts can help prevent stucco damage and the unwanted growth of mold and vegetation. In buildings where stucco has been repeatedly replaced thereby creating a patchwork appearance, consider removing previous repairs prior to patching. Minor hairline cracks larger than .030 inches typically can be corrected with a thin skim coat of stucco. Caulk is not a long-term solution for material for repairs and generally, has a high failure rate. Stucco should be flush with the surrounding area and blended to be as seamless as possible. Consider using a compatible stucco mixture that simulates the density and porosity of the original material, when possible.

Imitative Substitute Materials: Replacement of front facade stucco cladding with imitative substitute materials is an allowable treatment approach provided that the imitative substitute material meets the Design Guidelines and design considerations. Further guidance can be found in *Preservation Brief 16 The Use of Substitute Materials on Historic Exteriors.* The following list provides examples of imitative substitute materials for stucco siding. Please note that the list of materials is anticipated to expand as new materials and products are introduced and become available.

Acrylic Stucco	Acrylic stucco, a synthetic stucco, is composed of acrylic resins and polymers. The material is designed to be applied over masonry or cement to replicate the texture and appearance of stucco. It is water-repellent, elastic, flexible, and durable. It is not prone to hair-line cracks or flaking. Acrylic stucco is produced with a variety of aggregates, and custom textures are available. Additionally, it is produced with a range of colors and shades. It can be painted. Like historic stucco, finish coats can be

	added during installation. Acrylic stucco can be applied over Exterior Insulation and Finish Systems (EIFS) to provide a customized finish. However, acrylic stucco generally is more expensive that traditional, concrete-based stuccos.
Exterior Insulation and Finish Systems	EIFS is a multi-layer system that has both face-sealed and drainable versions. The drainable version includes a water-resistant barrier, drainage plane, insulation, reinforced mesh, water-resistant coat, and a topcoat. The face-sealed version does not include the drainage plane. EIFS is a lightweight, waterproof, malleable, insulating, and inexpensive material. Without correct installation, water easily can be trapped between the layers of the material causing mold, rot, rust, and, ultimately, failure. This issue is compounded by installation over substrates, such as wood, that also trap moisture and using the face-sealed version. In the past 20 years, EIFS has been reengineered to include weep holes, which has abated earlier serious issues with moisture; however, care should be undertaken to insure proper installation. Acrylic or traditional stucco can be applied on top to provide a custom finish.
Elastomeric Paint	Elastomeric, or acrylic, paint can be applied to newly installed acrylic stucco, EIFS, or fiber cement boards. However, it has limited use on historic stucco and should not be applied. It is only appropriate to apply cement-, latex-, or oil-based paints to historic stucco.
Fiber Cement Board	Fiber cement is composed of cement, sand, and cellulose fibers. It is a customizable material that allows for the application of stucco over the board. A skim coat can be applied to match the surrounding historic stucco. Additionally, some cement boards are manufactured with a stucco finish and are pre-primed for painting. Fiber cement boards often are manufactured to be water resistant and insulating. Additionally, it is durable. However, it is heavy and difficult to cut. Acrylic or traditional stucco can be applied on top to provide a custom finish.

Roofing

The *Design Guidelines* support the repair and maintenance of historic materials used in roofs, when appropriate. Associated elements to roofing include eaves, valleys, drainage features, pediments, cornices, brackets, chimneys, and flashing details. In cases where replacement of roof sheathing is desirable or necessary, either the in-kind replacement of historic materials or the

installation of imitative materials that simulate the size and finish of the historic building material are approaches authorized under the *Design Guidelines*.

The following discussion of treatments appropriate to the replacement of deteriorated roof sheathing applying the *Design Guidelines* is based on a three-step process: 1) Identify existing and/or historic application; 2) Identify design considerations of location, type, size, finish, and design maintenance to be factored in the replacement as appropriate to the requirements of the project; and 3) Select in-kind or imitative materials meeting the design considerations and *Design Guidelines*.

Historic Use: Several types of roof sheathing historically was used in Army buildings including slate, clay tile, and metal. While roof form and material vary, associated elements tend to be limited to one or two historic materials. For example, historic drainage features such as gutters are most likely metal. Chimneys historically were clad in brick, concrete, or stucco.

Clay Tile: Clay tiles historically were produced by baking molded clay into tile. Installation includes pantiles, flat tiles, or field tiles. Pantiles are convex or rounded tiles, often grouped together generically as "pantiles". These include Spanish tiles (sometimes referred to as "S" tiles) or the similarly shaped Mission or "Barrel" tiles. Flat, shingle tiles can either be flat or interlock at the top and on one side. Although the interlock holds them together, most interlocking shingle tiles also have one or more holes near the top for nailing to the roof sheathing. Plain or flat tiles require nailing and are not interlocked. Field tiles are those covering the majority of the flat surface of the roof. Some roof shapes, such as towers or turrets, require tiles of varying sizes, and some shapes or patterns of field tiles also require specially shaped finish tiles to complete covering the roof.

Slate: Slate is a fine-grained, foliated, homogeneous metamorphic rock manufactured as a tiled roofing material. The mineral composition of slate will determine the color and weathering properties.

Metal: Sheets of lead and copper have been used for roofing since classical times. Usually, metal roofs are applied large sheets joined with standing seams to prevent leaks. In the early 19th century, sheet iron coated with zinc, tin, or lead to prevent rust came into use. Later in the 19th century stronger corrugated panels of iron became common.

Design Considerations: Five major factors should be considered in the selection of in-kind and imitative substitute materials simulating roof sheathing: location, type, size, finish, and design maintenance. Consideration of these factors will support retention of the overall design integrity of the building and the associated historic district:

Location: The historic use of roof sheathing in the overall building design and visibility of the proposed work are recommended considerations when choosing a suitable replacement material. Depending on material, it may be more feasible to replace an entire roof while, in some considerations, it may be more appropriate to replace only damaged shingles or tiles. Drainage features, such as gutters, are recommended to follow a similar path and placement unless such patterns no longer provide functional use.

Type: Sheathing type often results in distinctive roofing appearances. For example, pantiles are installed to produce a “barrel” or “S” shape, while flat tiles are installed to create a smooth, flat surface. Replacement materials should be selected to simulate the type of historic sheathing and to simulate the historic roof appearance through shape, texture, color, and installation. Ensure the use of compatible fasteners.

Size: The dimensions of the roof tile or shingle, drainage feature, and decorative feature also are factors in the appearance of the roof. Replacement shingles or tiles should approximate the overall height, width, and depth of the existing or historic fabric as closely as possible. Replacement that strives to replicate the dimensions of historic shingles or tiles, where possible, will contribute to the preservation of the overall design integrity of the individual building as well as maintain consistency within the historic district. Decorative features such as cornices or pediments are recommended to retain similar size and dimensions to historic units. Drainage features, such as gutters, also are recommended to retain similar size and dimensions unless functional use requires them to be expanded.

Finish: Roof shingles or tiles may be naturally colored or textured or painted and glazed. Pigment medium, texture, and reflective quality of finishes of the shingles or tiles can contribute to the visual character of the building design and the historic district. Pigment mediums, including paint and glazes, used in replacement sheathing should simulate the finish medium, texture, and reflective quality of the existing or historic materials, where possible. The selection of paint or natural-colored materials should consider compatibility with the historic area: both the dwelling roof and those of the historic district. It is important to remember asbestos shingles were designed as imitative substitute materials for slate and clay tile. Imitative substitute materials should simulate those slate or clay tile finishes. Decorative and drainage features are recommended to exhibit a similar texture, finish, and color as historic units. For example, replacing an historic copper gutter system with a white, vinyl gutter system will significantly alter the texture, color, and finish of the system and is not recommended.

Design Maintenance: When in-kind materials are selected as a treatment approach, consider roofing repair and replacement methods that follow preservation guidance found in the *Secretary of the Interior’s Guidelines for Rehabilitating Historic Buildings* and *Preservation Brief 29: The Repair, Replacement, and Maintenance of Historic Slate Roofs* and *Preservation Brief 30: The Preservation and Repair of Historic Clay Tile Roofs*. Consider selective repair of damaged units to prevent further failure, when possible. Consider stockpiling extra roofing used in repair or replacement projects for future work. Ready access to either in-kind or imitative materials used in earlier work can be cost efficient and assure materials match in future work.

Recommended Materials**:**

In-kind Repair and / or Replacement: In-kind replacement of roof sheathing is a treatment approach identified in the *Design Guidelines*. In-kind replacement of historic materials should be consistent with the *Design Guidelines* and design considerations identified for the element. Additional guidance is contained in the *Secretary of the Interior’s Guidelines for Rehabilitating Historic Buildings*. Detailed guidance on in-kind repair and replacement of historic materials has

been developed by the National Park Service in their *Preservation Briefs* series. *Preservation Brief 4 Roofing for Historic Buildings, Preservation Brief 19 The Repair and Replacement of Wood Shingle Roofs, Preservation Brief 29 The Repair, Replacement, and Maintenance of Historic Slate Roofs, and Preservation Brief 30 The Preservation and Repair of Historic Clay Tile Roofs* particularly may be relevant to roof projects.

Imitative Substitute Materials: Replacement of roof sheathing with sheathing fabricated in imitative substitute materials is an allowable treatment approach provided that the imitative material meets the Design Guidelines and design considerations. Further guidance can be found in *Preservation Brief 16 The Use of Substitute Materials on Historic Exteriors.* The following list provides examples of imitative substitute materials that may meet the Design Guidelines and design considerations for roofing. Please note that the list of materials is anticipated to expand as new materials and products are introduced and become available.

Tile	Composite tile provides the same look as traditional clay and concrete shingle tiles but are lightweight and are installed without the need for structural roof modifications. Composite tile can be installed in cold and warm weather climates with no risk of cracking due to weatherization.
Engineered Wood	Engineered wood to replace wood shingles is composed of compressed resin and wood chips; generally, it is treated to protect against rot and termites. It is significantly less expensive than traditional wood shingles and does not rot. Additionally, it performs well under most weather. However, it requires painting and upkeep of color.
Fiber Cement	Fiber cement is composed of cement, sand, water, and fiber. It is typically more expensive and significantly heavier than other options, making installation more difficult. Additionally, fiber cement requires periodic recaulking of joints. It must be repainted approximately every 15 years.
Asphalt Composition	Asphalt composition tiles are the most common roofing material in the United States. Usually, asphalt shingles are made of either fiberglass or organic recycled paper-based products mixed with asphalt, which is then covered with colored mineral granules. These shingles can be manufactured to imitate a variety of roofing tiles including slate. While the cost is relatively cheap, averaging seven to twelve dollars per square foot, the lifespan averages 20 years and the material requires regular maintenance. Architectural asphalt shingles are produced to better simulate the appearance of the historic material.
Plastic and Rubber Composites, Membrane	Plastic and synthetic rubber composites are plastics that are strengthened with fibers, fillers, particulates, powders, and other matrix

	reinforcements to provide improved strength or stiffness. Several manufacturers produce plastic and rubber composites that are marketed as synthetic slate roof tile that simulate weathered slate tiles. Membrane is generally used on flat or low-sloped roofs.
Resin	Resin is a flexible material that can be used in both interior and exterior molding. It is resistant to insects and moisture and does not warp, crack, or deteriorate. It can be molded in custom shapes, nailed, glued, sawn, or drilled. It typically is heavier than PVC or vinyl.
Metal	Metal roofs typically are composed of steel, aluminum, or copper sheets with a baked-on finish. The thicker the material, the longer the metal roof will last. Coatings can imitate historic materials such as shingle, clay tile, or slate. The material is durable and lightweight.

Porches (Front facade only)

The *Design Guidelines* support the repair and maintenance of historic materials used in front facade porches, when appropriate. In cases where replacement of front facade porch materials is desirable or necessary, either the in-kind replacement of historic materials or the installation of imitative substitute materials that simulate the size and finish of the historic building material are approaches authorized under the *Design Guidelines*.

The following discussion of treatments appropriate to the replacement of deteriorated front facade porches applying the *Design Guidelines* is based on a three-step process: 1) Identify existing and/or historic application; 2) Identify design considerations of location, type, size, finish, and design maintenance to be factored in the replacement as appropriate to the requirements of the project; and 3) Select in-kind or imitative substitute materials meeting the design considerations and *Design Guidelines*.

Historic Use: Porches historically are a highly visible aesthetic historic building component. Architectural and design elements of porches generally were dictated by the dwelling's overall architectural style and, occasionally, geographical location. Common elements of porches include supports, railings, porch coverings, awnings, port-cochere, decking, and stairs.

Supports: Supports are vertical beams, posts, or columns that support porch roofs. Typically, an inner core of solid timber or steel provides the required support. Supports generally are clad in masonry (stone or brick) or may be a decorative wood beam.

Railings: Railings are a guard, serving both a function and aesthetic purpose, designed to prevent people from falling from raised porches. Typically, a railing includes a rail and railing cap, and posts. Railings generally are constructed of wood, iron, or masonry materials. Masonry railing may or may not include balusters.

Stairs: Stairs are a construction element designed to bridge a vertical distance by dividing it into smaller vertical distances called steps. Steps may be straight, round, or consist of two or more straight pieces connected at angles. Exterior entry stairs generally are constructed of brick, stone, or wood.

Design Considerations: Five major factors should be considered in the selection of in-kind and imitative substitute materials: location, type, size, finish, and design maintenance. Consideration of these factors will support retention of the overall design integrity of the building and the associated historic district:

Location: Consider the historic use and placement of porches in the overall front façade design and the visibility of the proposed replacement material. Consider limiting replacement to deteriorated areas of the porch, when possible.

Type**:** Material type often results in distinctive characteristics and design elements. For example, a brick support column creates a distinct design, texture, and scale to the porch and dwelling. Replacement materials should be selected to simulate the type of historic materials used on the porch and replicate the porch's historic appearance as closely as possible.

Size: The dimensions of porch elements are factors that create the overall appearance of the entrance. Replacement materials should approximate the overall height, width, and depth of the existing historic elements as closely as possible. Projects that strive to replicate the overall front façade porch design and the dimensions of historic elements, where possible, often are most successful in maintaining the historical and architectural character of the individual building and the associated historic district.

Finish: Color, texture, and reflective quality of finishes to porch materials contribute to the visual character of the exterior building design and historic district. Consider pigment mediums, including paint and stains that simulate the finish medium, texture, and reflective quality of existing or historic materials, where possible. Consider paint or stain colors that are compatible with those used in the surrounding historic area. Porch elements that were not historically painted, such as stone or brick, should not be painted.

Design Maintenance: The character of in-kind materials and imitative substitute materials also may differ over time from the original units as the materials age. Selective replacement of deteriorated brick, stone, cement, or wood elements using imitative materials may become more aesthetically apparent over time due to the speed at-which the material ages. Consider replacement strategies that limit or avoid the potential of unintended impacts to design integrity, when possible.

Recommended Materials:

In-Kind Repair and / or Replacement: In-kind replacement of front facade porch elements is a treatment approach identified in the *Design Guidelines*. In-kind replacement of historic materials should be consistent with the *Design Guidelines* and design considerations identified for the element. Additional guidance is contained in the *Secretary of the Interior's Guidelines for*

Rehabilitating Historic Buildings. Detailed guidance on in-kind repair and replacement of historic materials has been developed by the National Park Service in their *Preservation Briefs* series. *Preservation Brief 45 Preserving Historic Wood Porches* particularly may be relevant to porch projects.

Imitative Substitute Materials: Replacement of porches and elements with imitative substitute materials is an allowable treatment approach provided that the imitative substitute material meets the *Design Guidelines* and design considerations. Further guidance can be found in *Preservation Brief 16 The Use of Substitute Materials on Historic Exteriors.* The following list provides examples of imitative substitute materials. Please note that the list of materials is anticipated to expand as new materials and products become available.

Vinyl	Vinyl column, railing, and balustrade units typically are an inexpensive imitative substitute material—about half the price of the wooden equivalent. However, vinyl is susceptible to size changes due to heat. Elements very in quality and durability. Vinyl can have a shiny "plastic" appearance that may not be appropriate in certain circumstances.
Manufactured Stone	Manufactured stone veneer is an engineered product intended to look like its natural counterpart. It is composed of a mixture of Portland cement, iron oxides, and aggregates. It is light, uniform, and widely available. The material is brittle and susceptible to color fading over time.
Veneer	Veneer is a thin layer of natural stone or brick typically applied over a masonry or non-masonry surface. It is a durable product and typically less expensive than brick and stone.
Fiber Cement Board	Fiber cement is composed of cement, sand, and cellulose fibers. It is a customizable material that allows for the application of stucco over the board. A finish, skim, coat can be applied to match the surrounding historic stucco. Some cement boards are manufactured with a stucco finish and are pre-primed for painting. Additionally, acrylic or traditional stucco can be applied on top to provide a custom finish. Fiber cement boards often are manufactured to be water resistant and insulating and retain high durability. However, the material is heavy and difficult to cut.
Fiberglass	Fiberglass is a durable and low maintenance reinforced plastic material that is composed of a woven material embedded with glass fibers laid across each other and held together with a binding substance. Railing and columns are manufactured using fiberglass and often are produced to

	simulate historic materials such as metals or wood. May expand and contract with extreme heat and cold.
Aluminum	Aluminum is a light, durable, and functional metallic material. The cost-effective material often is used in construction as it is long-lasting and does not require dedicated maintenance. Railing and columns are manufactured using aluminum and may include detailed elements to simulate wood carvings.
Molded Plastic	Molded plastic is an affordable and durable material manufactured for use as columns and railings. As the name suggests, plastic is molded to simulate carvings and detail elements in wood columns and railings.
Resin	Resin is a flexible material that can be used in both interior and exterior molding. It is resistant to insects and moisture and does not warp, crack, or deteriorate. It can be molded in custom shapes, nailed, glued, sawn, or drilled. It is heavier than PVC or vinyl.

Window Bays (Front facade only)

The *Design Guidelines* support the repair and maintenance of historic materials used in window bays, when appropriate. In cases where replacement of front facade window bays or their component parts is desirable or necessary, either the in-kind replacement of historic materials or the installation of imitative substitute materials that simulate the size, design, and finish of the historic building material are approaches authorized under the *Design Guidelines*.

The following discussion of treatments appropriate to the replacement of deteriorated front facade window bays applying the *Design Guidelines* is based on a three-step process: 1) Identify existing and/or historic application; 2) Identify design considerations of location, type, size, finish, and design maintenance to be factored in the replacement as appropriate to the requirements of the project; and 2) Select in-kind or imitative substitute materials meeting the design considerations and *Design Guidelines*.

Historic Use: Window bays include the sash, glass, surrounds, lintels and sills, storm or screen windows, and shutters. Some windows include decorative features such as leaded or stained glass. Window bays typically are located on all elevations and in dormers. They can vary greatly in size within one building; however, the type and variation of windows typically are consistent throughout a historic district. Window bays of varying design are found on pre-1941 buildings. Window replacement is a common modification to the Army inventory. Later window modifications include the installation of modern vinyl replacement units.

Design Considerations: Five major factors should be considered in the selection of in-kind or imitative substitute materials simulating windows: location, type, size, finish, and design

maintenance. Consideration of these factors will support retention of the overall design integrity of the building and the associated historic district:

Location: Windows influence both the visual design quality and functionality of a dwelling. Interior light, ventilation, and architectural style were considered in the development of building plans. Consider retaining historic front facade patterns of structural bay openings in window projects to maintain the historical and architectural character of the building, when possible. Avoid infilling existing bays, when possible, and limit structural modifications to less visible rear and secondary elevations. Front facade replacement window units should match the design of historic units as closely as possible. Consider establishing a standardized replacement design for all buildings historically constructed from the same standardized design to maintain the architectural character of the area.

Type: Windows are defined by both their sash and light arrangement. Common configurations include six-over-six, nine-over-nine, and one-over-one. Match window types in sash and light arrangement as closely as possible. Consider storm or screen windows that do not obscure the window design. Consider maintaining or simulating historic window features such as surrounds and transoms.

Size: The dimensions of the window bays include the overall height, width, and depth of the existing or historic fabric. Replacement units that strive to simulate the dimensions of historic window bays, where possible, will contribute to the preservation of the overall design integrity of the individual building as well as maintain consistency within the historic district. Avoid the infill of structural window bays to accommodate units of smaller size when at all possible.

Finish: Pigment medium, texture, and reflective quality of window bay finishes are determined by their material. The finish can contribute to the visual character of the exterior building design and the historic district. Pigment mediums, including paint and stains, used in replacement should simulate the finish medium, texture, and reflective quality of the existing or historic materials, where possible. The selection of paint or stain color should consider compatibility with the historic area. However, it is not necessary to utilize original colors that may have been determined through a chemical paint analysis.

Design Maintenance: Wood and aluminum age differently than many imitative substitute materials. Selective replacement of window units and trim on an elevation may become more obvious over time.

Recommended Materials**:**

In-Kind Repair and / or Replacement: In-kind replacement of front facade window bays is a treatment approach identified in the *Design Guidelines*. In-kind replacement of historic materials should be consistent with the *Design Guidelines* and design considerations identified for the element. Additional guidance is contained in the *Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings*. Detailed guidance on in-kind repair and replacement of historic materials has been developed by the National Park Service in their *Preservation Briefs* series, *Preservation Brief 9 The Repair of Historic Wooden Windows*.

Imitative Substitute Materials: Replacement of front facade window units and trim with imitative substitute materials is an allowable treatment approach provided that the imitative substitute material meets the *Design Guidelines* and design considerations. Further guidance can be found in *Preservation Brief 16 The Use of Substitute Materials on Historic Exteriors.* The following list provides examples of imitative substitute materials for window bays. Please note that the list of materials is anticipated to expand as new materials and products become available.

Vinyl	Vinyl windows typically are the least expensive imitative material—about half the price of the wooden equivalent. Vinyl units can be energy-efficient and well insulated. The sash is very durable; frequently, the muntins and mullions are integrated between two panes of glass, which prevents damage to what typically is a delicate member. Vinyl is susceptible to expansion due to heat.
Fiberglass	Fiberglass windows, like vinyl, are lighter than wood; however, fiberglass has the added benefit of stiffness, which allows for a thinner unit. The windows are temperature stable and do not expand or contract, which helps prevent water infiltration. Units can be coated in wood veneer to better simulate the natural material and can be used as replacement for architectural features. Fiberglass windows approximately are 25 per cent more expensive than vinyl units. Fiberglass may fade over time.
Aluminum	Aluminum windows still are produced and can be substituted for historic wooden units or an in-kind replacement for aluminum. Aluminum windows can be clad in wood and painted to simulate the appearance of wooden units. Aluminum units are produced in many different sizes and styles. However, the units can be expensive, can corrode, and are not as widely available as other substitutive materials.
Resin	Resin is a flexible material that can be used in both interior and exterior molding. It is resistant to insects and moisture and does not warp, crack, or deteriorate. It can be molded in custom shapes, nailed, glued, sawn, or drilled. It typically is heavier than PVC or vinyl.

Exterior Entries (Front facade only)

The *Design Guidelines* support the repair and maintenance of front facade historic entries. In cases where replacement of front facade entries is desirable or necessary, either the in-kind replacement of historic materials or the installation of imitative materials that simulate the size,

design, and finish of the historic building material are approaches authorized under the *Design Guidelines*.

The following discussion of treatments appropriate to the replacement of deteriorated exterior entries applying the *Design Guidelines* is based on a three-step process: 1) Identify existing and/or historic application; 2) Identify design considerations of location, type, size, finish, and design maintenance to be factored in the replacement as appropriate to the requirements of the project; and 3) Select in-kind or imitative materials meeting the design considerations and *Design Guidelines*.

Historic Use: Entry units include doors, storm doors, screen doors, transoms, sidelights, fanlights, trim, thresholds, hardware, and surrounds. Historically, wood panel doors were installed at the entrance of pre-1941 buildings. Wooden doors have been retained at installations across the United States. Metal units, such as steel and aluminum, also are present.

Design Considerations: Five major factors should be considered in the selection of in-kind or imitative substitute materials simulating entries: location, type, size, finish, and design maintenance. Consideration of these factors will support retention of the overall design integrity of the building and the associated historic district:

Location: Front facade entrances are a major character-defining feature in the design of historic buildings. Original front facade entry bays and associated architectural elements should be maintained when possible.

Type: Doors are classified by whether they contain panels or glazing and if they are single- or double-leaf. Panels and glazing are decorative elements common to doors. The number of leafs typically dictates the size of the opening. If front facade door replacement becomes necessary, consider simulating the historic unit, including panels, glazing, and number of leaves, as closely as possible. Avoid entry units that include elements that were not part of historic units, as appropriate. Consider storm or screen doors that do not obscure the appearance of the entry. Maintain sidelights, transoms, and fanlights, where possible as well as the pattern of door glazing or panels.

Size: The dimensions of entries also are factors in the appearance of the exterior wall. Front façade replacement entries and doors should approximate the overall height, width, and depth of the existing or historic fabric as closely as possible. Replacement that strives to replicate the dimensions of the historic entry, where possible, will contribute to the preservation of the overall design integrity of the individual building as well as maintain consistency within the historic district.

Finish: Pigment medium, texture, and reflective quality of finishes to entries can contribute to the visual character of the exterior building design and the historic district. Pigment mediums, including paint and stains, used in replacement materials should simulate the finish medium, texture, and reflective quality of the existing or historic materials, where possible. The selection of paint or stain color should consider compatibility with the historic area.

Design Maintenance: Wood and aluminum can age differently than imitative substitute materials. In cases where the replacement of entry elements with imitative substitute materials is required, consider replacement of the complete element to avoid obvious visual differences over time.

Recommended Materials:

In-Kind Repair and / or Replacement: In-kind replacement and repair of entries is a treatment approach identified in the *Design Guidelines.* Replacement of historic materials should be consistent with the *Design Guidelines* and design considerations identified for the element. Additional guidance is contained in the *Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings*.

Imitative Substitute Material: Replacement of front facade entries with imitative substitute materials is an allowable treatment approach provided that the imitative substitute material meets the *Design Guidelines* and design considerations. Further guidance can be found in *Preservation Brief 16 The Use of Substitute Materials on Historic Exteriors.* The following list provides examples of imitative substitute materials for entries. Please note that the list of materials is anticipated to expand as new materials and products become available.

Vinyl	Vinyl doors and architectural features typically are the least expensive imitative material—about half the price of the wooden equivalent. However, vinyl is susceptible to size changes due to heat. Typically, vinyl doors are sliding glass units.
Fiberglass	Fiberglass doors, like vinyl, are lighter than wood; however, fiberglass has the added benefit of durability and an insulated core. Units can be coated in wood veneer to better simulate the natural material. Fiberglass doors approximately are 25 per cent less expensive than vinyl units. Fiberglass tends to fade.
Metal	Aluminum and steel doors can be substituted for historic wooden units or an in-kind replacement for aluminum. Units can be hollow-core or solid-core. Most metal doors can be clad in wood to simulate the appearance of wooden units and are produced in many different sizes and styles. However, the units can be expensive and can corrode.
Resin	Resin is a flexible material that can be used in both interior and exterior molding. It is resistant to insects and moisture and does not warp, crack, or deteriorate. It can be molded in custom shapes, nailed, glued, sawn, or drilled. It typically is heavier than PVC or vinyl.

Designed Landscapes and Features in Cantonment Areas (not applicable outside of Army cantonment areas)

The *Design Guidelines* support the repair and maintenance of historic materials used in designed landscapes and circulation features, when appropriate. In cases where replacement of designed landscaping features is desirable or necessary, either the in-kind replacement of historic materials or the installation of imitative substitute materials that simulate the species, size, or finish of the historic material are approaches authorized under the *Design Guidelines*.

The following discussion of treatments appropriate to the replacement of landscape design features applying the *Design Guidelines* is based on a three-step process: 1) Identify existing and/or historic application; 2) Identify design considerations of location, type, size, finish, and design maintenance to be factored in the replacement as appropriate to the requirements of the project; and 3) Select in-kind or imitative materials meeting the design considerations and *Design Guidelines*.

Historic Use: Designed landscapes and features historically served as aesthetic and functional site features in cantonment areas during the pre-1941 period. Built features, such as lighting, fencing, hardscape and street furniture, may reflect the dominant architectural styles of the installation. Site designs were influenced by contemporary designs of the historic period and may have included street plans, building setbacks, sidewalks, and street trees. Plantings were specific to geography and climate.

Design Considerations: Five major factors should be considered in the selection of replacement materials or species in / for designed landscape features: location, type, size, finish, and design maintenance. Consideration of these factors will support retention of the overall design integrity of the setting the building and the associated historic district:

Location: The historic design of landscapes, circulation patterns, setbacks, plant materials, and communal landscapes contribute to the qualities of the area. Historic site and landscape designs often complement building designs. Consider the spatial divisions established in historic plans. These designs should be respected, where possible, to maintain the historic and architectural character of the area. Consider replacement elements that simulate historic designs and placement, where possible. Consider replacement plant materials from any approved installation list that are the same species as the original, if native and non-invasive, and planted following the historic landscape plans.

Type: Landscape type often results in distinctive residential streetscapes and environments. Historic landscape design uses plantings and built structures to enhance residential areas. The history of landscape design follows a progression similar to that seen in architectural design. Site and landscape designs were influenced by dominant styles in the field, and regional designs standards.

Size: The dimensions and spacing of landscape features are factors affecting the overall streetscape. Replacement materials should approximate the overall height, width, depth, and spacing of the existing or historic elements as closely as possible. Replacement that strives to replicate the

placement and spacing of historic landscape design, where possible, will contribute to the preservation of the overall design integrity of the dwelling and historic district.

Finish: Materials utilized in landscape features such as fencing, pathways, and gazebos may have pigment medium, texture, and reflective quality of finishes which contribute to visual character of the landscape design and the historic district. Pigment mediums, including paint and stains, used in replacement should simulate the finish medium, texture, and reflective quality of the existing or historic materials, where possible. The selection of paint or stain color should consider compatibility with the historic area. However, it is unnecessary to utilize original colors that may have been determined through a chemical paint analysis.

Design Maintenance: The character of in-kind materials and imitative substitute materials may differ over time as the materials age. Consider the aesthetic differences that may become apparent over time in materials selection and maintenance protocols, when possible. Consider replacement strategies that limit or avoid the potential of unintended impacts to design integrity, when possible.

Recommended Materials:

In-Kind Repair and / or Replacement: In-kind replacement of cantonment area landscape design features is a treatment approach identified in the *Design Guidelines*. In-kind replacement of historic materials should be consistent with the *Design Guidelines* and design considerations identified for the element. It may not be possible to source plant, materials that exactly match the historic species or material. Further, there also may be species or historic placements that are not appropriate to maintain or simulate in the modern era. Additional guidance is contained in the *Secretary of the Interior's Guidelines for Rehabilitating Historic Buildings* and the *Secretary of the Interior's Guidelines for the Treatment of Cultural Landscapes*. Detailed guidance on in-kind repair and replacement of historic materials has been developed by the National Park Service in their *Preservation Briefs* series. *Preservation Brief 36 Protecting Cultural Landscapes - Planning, Treatment and Management of Historic Landscapes* particularly may be relevant to landscape and feature projects.

Imitative Substitute Material: Replacement of landscape features is an allowable treatment approach provided that the imitative substitute material meets the Design Guidelines and design considerations. The following list provides examples of imitative substitute for designed landscapes and landscape features. Please note that the list of materials is anticipated to expand as new materials and products become available.

Vinyl	Vinyl is an inexpensive imitative substitute material that can be used as a replacement for wood units (gazebos and bridges). Vinyl units can be finished with woodgrain to give the appearance of a wooden unit. Further, vinyl often is manufactured in a variety of sizes and dimensions to simulate historical units. However, vinyl is susceptible to size changes due to heat. While vinyl may be used to simulate

	wood fencing, the reflective quality and texture often noticeably differs from historic wood units.
Fiberglass	Fiberglass is a durable and low maintenance reinforced plastic material which is composed of a woven material which is embedded with glass fibers laid across each other and held together with a binding substance. Components for fencing, bridges, gazebos, and other built landscape features are manufactured using fiberglass and often are produced to simulate historic materials such as metals or wood.
Engineered Wood	Engineered wood is composed of compressed resin and wood chips. Generally, it is treated to protect against rot and termites; it does not rot. Additionally, it performs well under most weather conditions. Engineered wood may be used to simulate built wood materials and objects such as fences, bridges, and gazebos. The material requires maintenance and painting.
Aluminum	Aluminum units are available for fencing and bridges. Aluminum units generally have a metallic finish and likely will require paint to simulate historic units. Aluminum units are produced in many different sizes and styles. However, the units can be expensive, can corrode, and are not as widely available as other imitative substitute materials.
Manufactured Stone	Manufactured stone veneer is an engineered product intended to look like its natural counterpart. It is composed of a mixture of Portland cement, iron oxides, and aggregates. It is light, uniform, and widely available. The material is brittle and susceptible to color finding over time.
Veneer	Veneer is a thin layer of natural stone or brick typically applied over a non-masonry surface. It is a durable product and typically less expensive than brick and stone.
Xeriscape	Xeriscaping not a product, rather it is a form of drought tolerant landscaping made up of plants that need less irrigation than standard landscaping plants. Xeriscaping often takes the form of shrubs separated by mulch, small grassy areas and decorative stone pathways Xeriscaping typically involves limited or no turfgrass. Xeriscaping may be an option for enclosed backyards as long as drought tolerant plant species and placement do not deviate greatly or alter historic elements.
Resin	Resin is a flexible material that can be used in both interior and exterior molding. It is resistant to insects and moisture and does not warp, crack, or

	deteriorate. It can be molded in custom shapes, nailed, glued, sawn, or drilled. It typically is heavier than PVC or vinyl.