

PROGRAM COMMENT FOR DEPARTMENT OF DEFENSE REHABILITATION

TREATMENT MEASURES

I. Establishment and Authority: This Program Comment was issued by the Advisory Council on Historic Preservation (ACHP) on (date of establishment) pursuant to 36 CFR 800.14(e).

It provides the Department of Defense (DoD) with an alternative way to comply with its responsibilities under Section 106 of the National Historic Preservation Act, 16 U.S.C. 470f, and its implementing regulations, 36 CFR part 800 (Section 106), with regard to the effects of rehabilitation treatment measures appended to this Program Comment.

The intent of this Program Comment is to reduce compliance timeframes for routine repair and maintenance undertakings involving historic properties where DoD chooses to repair and maintain those resources in accordance with the Secretary of the Interior's Standards for Rehabilitation, 36 CFR part 67 (Secretary's Standards for Rehabilitation).

II. Applicability to Department of Defense: Only DoD may use this Program Comment.

III. Date of Effect: This Program Comment will go into effect on (date of establishment).

IV. Use of Rehabilitation Treatment Measures to Comply with Section 106 Regarding their Effects:

(1) DoD may comply with Section 106 regarding the effects of rehabilitation treatment measures on historic properties, and those properties whose eligibility has not yet been determined, by:

(i) Conducting such work as provided by the relevant rehabilitation treatment measure(s) appended to this document, in conformance with the implementation guidance documents numbered 01060.01 and 01091.01 in those appendices;

(ii) Ensuring that all work described in the rehabilitation treatment measures is conducted under the supervision and approval of a cultural resources professional who meets the relevant standards outlined in the Secretary of the Interior's Professional Qualification Standards, pursuant to 36 CFR part 61 (Secretary's Standards on Professional Qualification); and

(iii) Keeping a record, at the relevant DoD installation, detailing each use of a rehabilitation treatment measure under this Program Comment for no less than five years from the final date of the implementation of the rehabilitation treatment measure. Each record must include the following information:

- (a) a description of the implementation of the rehabilitation treatment measure (including the specific location of the treatment);
- (b) the date(s) when the rehabilitation treatment measure was implemented;
- (c) the name(s) of the personnel that carried out and/or supervised the use of the rehabilitation treatment measure;
- (d) a summary of the treatment implementation, indicating how the rehabilitation treatment measure was carried out, any problems that arose, and the final outcome; and
- (e) a summary of any refinements to the rehabilitation treatment measures that the installation and relevant State Historic Preservation Officer (SHPO) have agreed upon per Stipulation IV(4), below.

DoD must provide copies of these records, within a reasonable timeframe, when requested by the ACHP or the relevant SHPO.

(2) Before it begins using this Program Comment, a DoD installation must provide written notification to the relevant SHPO stating that it intends to begin using it and specifying which rehabilitation treatment measures it deems appropriate for use with regard to the historic properties

at the installation. The installation may begin using this Program Comment 30 days after such notification.

(3) A DoD installation must also provide written notification to the relevant SHPO when it intends to begin using a rehabilitation treatment measure that has been added to this Program Comment per Stipulation VI. The installation may begin using such an added rehabilitation treatment measure 30 days after such notification.

(4) If, in the opinion of a DoD personnel or DoD contractor meeting the Secretary's Standards on Professional Qualification, quantifiable scientific or qualitative historic data indicates that a rehabilitation treatment measure covered by this Program Comment should be refined to accommodate a specific material or rehabilitation technique that is more suitable for the relevant historic properties at the installation and/or that more specifically meets the intent of the Secretary's Standards for Rehabilitation, the installation shall notify the relevant SHPO of that proposed refinement. (An example of a refinement would be the selection of a mortar joint profile appropriate for the historic property under consideration.) If, within 30 days of receiving that notification, the relevant SHPO disputes whether the proposed refinement to the rehabilitation treatment measure meets the Secretary's Standards for Rehabilitation, the installation and the relevant SHPO shall consult to attempt to resolve that

dispute. If the relevant SHPO and the installation agree to a proposed refinement, or the relevant SHPO fails to dispute it within the 30 day period, the installation may proceed in accordance with the proposed refinement. Consultation about, and agreement or disagreement regarding, proposed refinements does not affect the ability of an installation to continue using this Program Comment and any of its existing rehabilitation treatment measures.

V. Program Comment Does not Cover Aspects of Undertakings Beyond the Specific Rehabilitation Treatment Measures: While DoD may comply with Section 106 regarding the effects of rehabilitation treatment measures on historic properties in accordance with this Program Comment, the effects of those aspects of its undertakings that are not specifically covered by the appended rehabilitation treatment measures must still undergo Section 106 review in accordance with the process found at 36 CFR §§ 800.3 through 800.7, or applicable alternatives under 36 CFR § 800.14 other than this Program Comment. For example, a DoD undertaking that includes the treatment of the exterior masonry of a historic building (in accordance with a rehabilitation treatment measure of this Program Comment) and the demolition of its interior walls, will still have to undergo Section 106 review outside this Program Comment for those aspects of the undertaking involving the demolition of the interior walls.

VI. Process for Adding or Updating Rehabilitation Treatment

Measures: While this Program Comment, as originally adopted, was limited to five rehabilitation treatment measures, the ACHP expects more rehabilitation treatment measures to be added to it. The ACHP also expects that rehabilitation treatment measures included in the Program Comment may eventually need updating. Accordingly, rehabilitation treatment measures may be added to this Program Comment, or updated, as follows:

(1) DoD will notify the ACHP, the National Conference of State Historic Preservation Officers (NCHSPO), and DOI (collectively, parties) that it wants to add a rehabilitation treatment measure to the Program Comment, or to update a rehabilitation treatment measure that is already a part of the Program Comment. Such a notification will include a draft of the proposal.

(2) The parties will provide a copy of the draft to the National Trust for Historic Preservation, the American Institute of Architects, the American Institute for the Conservation of Historic and Artistic Works, and the Association for Preservation Technology, and consult with them before finalizing the proposal. The parties may invite other entities, including members of professional associations with expertise on the particular subject matter of the proposed rehabilitation treatment measure or update, to the consultation.

(3) After such consultation, DoD will submit the finalized version to DOI with a request for confirmation from DOI that the proposed rehabilitation treatment measure or update meets the criteria set forth in the Secretary's Standards for Rehabilitation. DOI will have 45 days to provide a written response to DoD. Should DOI determine that the proposed rehabilitation treatment measure or update does not meet the Secretary's Standards for Rehabilitation, DoD may consult with those listed on sub-stipulations (1) and (2), above, and revise the proposal for reconsideration by DOI.

(4) After DOI confirmation that the proposal meets the Secretary's Standards for Rehabilitation, or after the allotted 45 days pass without a DOI response (at which point, DOI confirmation will be assumed), DoD may submit the finalized version to the ACHP Executive Director. If the ACHP Executive Director approves it, the ACHP will publish a notice of availability of the approved addition or update in the Federal Register. The addition or update will go into effect upon such publication.

VII. Process for Removing Rehabilitation Treatment Measures: The ACHP may remove a rehabilitation treatment measure from the Program Comment by publishing a Federal Register notice to that effect. The Program Comment will continue to operate with the

other rehabilitation treatment measures that have not been removed.

VIII. Latest Version of the Program Comment: DoD and/or the ACHP will include the most current version of the Program Comment (with the latest amendments and updates) in a publicly accessible website. The latest web address for that site will be included in each of the Federal Register notices for amending, removing or updating rehabilitation treatment measures in the Program Comment. This document and its appended rehabilitation measures will initially be available at <https://www.denix.osd.mil/ProgramAlternatives>.

IX. Annual Reports and Meetings: The parties shall meet once a year, in November, to discuss the implementation of the Program Comment and to consider whether rehabilitation treatment measures that have not been updated in five years should be updated in accordance with Stipulation VI. At least 60 days prior to such meetings, the parties may request of DoD more information on any issues at specific military installations. DoD will collect information from these military installations on their experience, for the previous twelve months, on how often and where the Program Comment has been utilized, examples of successful implementation, and examples of failures or problems with implementation.

X. Amendment: The ACHP may amend this Program Comment (other than the appended rehabilitation treatment measures themselves, which are amended according to Stipulations VI and VII, above) after consulting with the parties and publishing a Federal Register notice to that effect.

XI. Termination: The ACHP may terminate this Program Comment by publication of a notice in the Federal Register 30 days before the termination takes effect.

XII. Sunset Clause: This Program Comment will terminate on its own accord on November 1, 2018, unless it is amended before that date to extend that period.

XIII. Historic Properties in Tribal Lands and Historic Properties of Significance to Indian tribes and Native Hawaiian

Organizations: This Program Comment does not apply in connection with effects to historic properties that are located on tribal lands and/or that are of religious and cultural significance to Indian tribes or Native Hawaiian organizations.

XIV. Definitions: The definitions found at 36 CFR part 800 apply to the terms used in this Program Comment.

XV. Rehabilitation Treatment Measure Appendices: (starting on next page)

SECTION 01060.01

**PRESERVATION LAWS, REGULATIONS, AND
EXECUTIVE ORDERS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Brief Overview of Federal Preservation Laws, Regulations, and Executive Orders

1.02 RELATED SECTIONS

- A. Section 01091.01 – General Building Reference Standards

1.03 DEFINITIONS

- A. Advisory Council on Historic Preservation (ACHP). An independent federal agency that promotes historic preservation nationally by providing a forum for influencing federal activities, programs, and policies that impact historic properties. The ACHP advises the President and Congress on national historic preservation policy and promotes the preservation, enhancement, and productive use of our nation's historic resources.
- B. Historic Properties. Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the National Register; such term includes artifacts, records, and remains which are related to such district, site, building, structure, or object.
- C. National Historic Landmark (NHL). Properties officially recognized by the federal government and designated by the Secretary of the Interior as being nationally significant. NHLs represent the nation's most significant historic places and possess exceptional value or quality in illustrating or interpreting the heritage of the United States in history, architecture, archaeology, engineering, and culture.
- D. National Register of Historic Places (National Register). The official federal list of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture, which have local, state, or federal significance.
- E. National Trust for Historic Preservation. A federally chartered nationwide membership organization that provides a variety of preservation services.
- F. Preservation. The act or process of applying measures to sustain the existing form, integrity, and material of a building or structure and the existing form and vegetative cover of a site. Preservation may include stabilization work (as needed) and ongoing maintenance of the historic property.
- G. State Historic Preservation Officer (SHPO). Appointed by the governors of the states, the chief executives of the territories, and the mayor of the District of Columbia, to carry out the historic preservation programs of their jurisdictions. SHPOs are given responsibilities by the National Historic Preservation Act and other federal authorities, which include nominating properties to the National Register; advising and assisting federal and state agencies and local governments in historic preservation matters; and working with the

Department of the Interior, the ACHP, and others to ensure that effects on historic properties are taken into account in planning.

1.04 REFERENCES

- A. The National Park Service provides guidelines, technical briefs, and bulletins on historic preservation policy and practices, including *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings*. U.S. Department of the Interior, National Park Service.
- B. U.S. General Services Administration Historic Preservation Technical Procedures
- C. The Advisory Council on Historic Preservation (ACHP) is an independent federal agency that promotes the preservation of our nation's historic resources. ACHP also provides public information on federal preservation acts and policies.
- D. The National Trust for Historic Preservation provides a variety of preservation-related services including limited grant programs, lobbying and technical assistance.

1.05 FEDERAL LAWS, REGULATIONS, AND EXECUTIVE ORDERS

- A. Antiquities Act of 1906: Earliest legislation enacted on the preservation and protection of American antiquities of historic and prehistoric remains on land owned or controlled by the federal government.
- B. National Park System Organic Act of 1916: Enacted to establish a NPS with the primary purpose to promote and regulate the use of the federal areas known as national parks, monuments, and reservations, and to conserve the scenery, the natural and historic objects, and wild life therein.
- C. Historic Sites Act of 1935:
 - 1. Establishes as national policy the preservation of historic sites, buildings, and objects of national significance for public use.
 - 2. Provides for the Secretary of the Interior, through the NPS, to keep records and lists of our most treasured historic places, which have expanded to include surveys and lists such as the Historic American Buildings Survey (HABS), the Historic American Engineering Record (HAER), the Historic American Landscapes (HAL), and the National Register. The NPS also develops standards and guidelines for historic rehabilitation projects and offers "how to" advice for hands-on preservationists.
- D. Charter of the National Trust for Historic Preservation of 1949:
 - 1. Enacted to further the policy contained in the Historic Sites Act of 1935, to facilitate public participation in the preservation of sites, buildings, and objects of national significance or interest, and provide a national trust for historic preservation.

- E. National Historic Preservation Act of 1966 (NHPA):
1. The single most important law governing federal agencies' treatment of historic properties.
 2. Encourages preservation at the state and private levels. The 1992 amendments to this act aimed to extend federal government concern to Indian tribal properties.
 3. Section 101(a) in Title I authorizes the Secretary of the Interior to establish and maintain a National Register for historically and architecturally significant buildings, structures, objects, sites, and historic districts.
 4. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties, i.e. buildings, structures, objects, sites, or historic districts, and to provide the ACHP an opportunity to comment on the effects of the undertakings.
 5. Section 110 of the NHPA sets out the broad historic preservation responsibilities of federal agencies and is intended to ensure that historic preservation is fully integrated into the ongoing programs of all federal agencies. Section 110 expands and makes more explicit the NHPA statement of federal agency responsibility for identifying and protecting historic properties and avoiding unnecessary damage to them. It also charges each federal agency with the affirmative responsibility for considering projects and programs that further the purposes of the NHPA, and it declares that the costs of preservation activities are eligible project costs in all undertakings conducted or assisted by a federal agency.
 6. Title II established the ACHP to comment on federal actions having an effect on historic properties. The ACHP has also developed and implemented procedures (36 CFR 800) to facilitate federal agency compliance with the NHPA.
 7. Title III of the act authorizes the provision of a National Museum for the Building Arts to collect and disseminate information concerning building arts.
 8. Title IV of the 1992 amendments to the act establishes a National Center for Preservation Technology and Training to promote research and dissemination of information on historic preservation.
 9. Under the 1992 amendments to the act, Indian tribes are encouraged to preserve their cultural and historic property. A program was established whereby a tribe may assume the duties of the State Historic Preservation Officer (SHPO) and nominate traditional properties to the National Register.
- F. Section 4(f) of the Department of Transportation Act of 1966:
1. The section declares maintenance and preservation of land traversed by transportation lines a national policy goal.
 2. The section prohibits the use of a historic site for federally funded transportation programs unless (1) there is not a feasible alternative use for the site, and (2) the program includes all possible planning to minimize potential harm to the resource.

- G. National Environmental Policy Act of 1969 (NEPA):
1. The act establishes a National Environmental Policy that requires federal agencies to assess as part of their overall project planning the impact of their project on the “environment,” which includes important historic and cultural aspects of the nation’s heritage.
 2. The act directs federal agencies to consult with agencies such as the NPS and the ACHP as part of the process to assess environmental impacts of a project.
- H. Executive Order 11593, 1971
1. Established to further the purposes and policies of the NEPA through the protection and enhancement of the cultural environment.
 2. The executive order requires all federal agencies to survey properties under their jurisdiction and nominate appropriate candidates to the National Register. It also requires each agency to ensure that resources that may be eligible for inclusion in the National Register are not inadvertently damaged, destroyed, or transferred prior to such survey. When possible and economically feasible, historic properties transferred are to be used “in a manner compatible with preservation objectives.” When National Register properties will be unavoidably altered or destroyed as a result of federal action, all agencies must provide for the recordation of the property in the appropriate NPS catalog.
 3. Also requires federal agencies to institute procedures to ensure their plans and programs “contribute to the preservation and enhancement” of non-Federally owned historic properties “of . . . significance.” The act also established requirements for consultation and review of any federal actions affecting properties that might be found eligible for the National Register.
- I. Public Buildings Cooperative Use Act of 1976:
1. Encourages adaptive use of existing structures of architectural, historical, or cultural interest; encourages multiple-use facilities on the site and shared-use facilities with the host community; and authorizes an alternative to new construction for federal projects.
- J. Title 36, Part 800 of the Code of Federal Regulations (36 CFR 800) – Regulations for the Protection of Historic Properties:
1. Issued by the ACHP, these regulations establish procedures for compliance with Section 106 of the NHPA; specifically, how federal agencies should take into account the effects of their undertakings on historic properties.
 2. Pursuant to Section 106 of the NHPA, Executive Order 11593, and the President’s Memorandum of July 12, 1978, “Environmental Quality and Water Resources Management,” the ACHP has set forth regulations for their review of federal undertakings that might affect either federally owned or leased, or non-federally owned historic and cultural resources eligible for or listed in the National Register.

3. This code defines terms used in the NHPA; describes initial procedures for identifying historic properties; restates the eligibility criteria for listing in the National Register; establishes criteria for determining the effect on a property of a federal action; sets forth procedures for ACHP review of the determination of effect; and defines legal obligations for consultation, discussion of alternatives, and determination of mitigating measures.
- K. Title 36, Part 67 of the Code of Federal Regulations (36 CFR 67) and Treasury Regulation Section 1.48-12 govern the use of the Federal Rehabilitation Tax Credit Program established in 1976. The program allows up to a 20-percent tax credit for qualifying repair and restoration expenses for eligible income-producing properties.
- L. Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) provides for funding of transportation enhancing activities including grants for restoration and preservation of historic structures and sites associated with the development of transportation in the United States.

1.06 STATE LAWS, REGULATIONS, AND EXECUTIVE ORDERS

- A. State Laws: Each state governor appoints a State Historic Preservation Officer (SHPO) pursuant to the National Historic Preservation Act of 1966. In addition to overseeing state legislated programs to protect and preserve non-federally owned historic properties, SHPOs provide consultation on the identification of historic properties, nominate properties to the National Register, and review federal, state, and local projects for potential effects on historic properties.
- B. State Antiquities Codes: An omnibus legislation providing protection for historic sites and objects. Typically established to protect relics, objects, sites, and unmarked burials discovered in archaeological explorations, state codes occasionally designate direct state control over historic properties and frequently stipulate penalties for violations.
- C. State Enabling Legislation:
 1. Enabling Legislation: Provides legal authorization for designated political subdivisions to protect historic resources, which often involves historic easements, tax abatements, and local historic districts.
 - a. Historic Easements: Legal method for preservation of private property for public use through public control over certain aspects of the property, thus protecting the character of historic places.
 - b. Historic Districts: Locally designated districts created by the state through county or local zoning ordinances that regulate exterior changes to buildings and structures in accordance with an overall comprehensive plan for maintaining the integrity of the historic district.
- D. State Historical Building Codes – Available in some states:
 1. State Historical Building Codes: Provide regulations and standards for the rehabilitation, preservation, restoration (including related reconstruction), or relocation as applicable to historical buildings, structures, and properties. These

standards and regulations are intended to facilitate preservation of original or restored elements and features, to encourage energy conservation, and to provide for compatible implementation of safety ordinances/codes such as fire, seismic forces, or other hazards.

1.07 LOCAL LAWS

A. Local Historic Regulations, Commissions, and Zoning

1. **Local Landmarks Commissions:** Locally appointed commissions that provide regulatory, project planning, and / or advisory functions in connection with their local preservation program. Commissions typically designate local landmarks and landmark districts, and require that design review procedures be integrated into local building codes. Commissions usually have a mandate to prohibit alteration, construction, reconstruction, or demolition of designated local landmarks, and are often authorized to review and approve or disapprove proposed changes to the physical environment of designated landmarks and landmark districts.
2. **Overlay Zoning:** Local governments can enact zoning ordinances for the protection of locally designated historic properties. The zoning sometimes provides an additional layer of regulations that must be adhered to over and above the standard zoning.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION

PART 1 – GENERAL

1.01 SECTION INCLUDES:

- A. Definitions – Historic Preservation
- B. Standards and Guidelines for Rehabilitating Buildings.
- C. References
- D. Preservation Organizations and Abbreviations
- E. Definitions – General
- F. Industry Standards
- G. Abbreviations

1.02 RELATED SECTIONS

- A. Section 01060.01 – Preservation Laws, Regulations and Executive Orders

1.03 DEFINITIONS – HISTORIC PRESERVATION

- A. Abandonment. The relinquishment of a property and/or the discontinuance of use of a property. Abandonment may be accomplished by voluntary act or by formal procedure.
- B. Adaptive Use. The process of converting a building to a use other than that for which it was designed, e.g., a factory converted into housing, generally accomplished through varying alterations to the building.
- C. Adverse Effect. The finding of a Section 106 review in which it is determined that a proposed federal action will adversely affect historic properties. See 36 CFR 800.
- D. Building. A man-made construction created to shelter human activity, such as a house, barn, church, hotel, or similar structure. Building may refer to a historically related complex such as a courthouse and jail, or a house and barn.
- E. Character-defining Feature. A prominent or distinctive aspect, quality, or characteristic of a historic property or district that contributes significantly to its physical and historic character.
- F. Comprehensive Historic Preservation Planning. The organization into a logical sequence of preservation information pertaining to identification, evaluation, registration and treatment of historic properties, and setting priorities for accomplishing preservation activities.
- G. Conservation. Physical stabilization of building materials and finishes.

- H. Cultural Resource. See Historic Property.
- I. Demolition by Neglect. The gradual destruction of a building or structure owing to lack of maintenance. Allowing a building or structure to deteriorate to the point where it is structurally unsound, and rehabilitation is not considered economically prudent or a viable alternative in order to justify demolition of a historic property. Demolition by neglect is also an adverse effect under Section 106 of NHPA.
- J. Determination of Eligibility. A decision by the Department of the Interior that a district, site, building, structure, or object meets the criteria for evaluation although the property is not formally listed in the National Register of Historic Places.
- K. Existing Conditions. Documentation of existing conditions (conditions before the start of work) is invaluable in drafting rehabilitation plans and specifications, and in assessing the impact of changes to the property for historic preservation purposes.
- L. Ex-situ. Off-site; moved from original location.
- M. Historic Architect. A person who meets the professional qualifications standards as set forth in 36 CFR 61 for historic architecture. Minimum qualifications are a professional degree in architecture or a state license to practice architecture, and at least one year of graduate study in architectural preservation, American architectural history, preservation planning, or closely related field; or a least one year full-time professional experience in historic preservation projects.
- N. Historic Context. A unit created for planning purposes that groups information about historic properties based on a shared theme, specific time period, and geographical area.
- O. Historic Preservation. The activities of identification, evaluation, recordation, documentation, curation, acquisition, protection, management, rehabilitation, restoration, stabilization, maintenance, research, interpretation, conservation, and education and training as related to historic properties.
- P. Historic Property. A historic property is defined in the NHPA as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places, including artifacts, records, and material remains related to such a property or resource.
- Q. In-situ. In place; in original location.
- R. Integrity. The authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during the property's historic or prehistoric period.
- S. Inventory. A list of historic properties determined to meet specified criteria of significance.
- T. Keeper of the National Register of Historic Places (Keeper). The individual to whom the authority has been delegated to list properties and determine their eligibility for the National Register.
- U. Memorandum of Agreement (MOA). A written agreement between the SHPO and a federal agency involving a single federal undertaking; any project-specific or programmatic

memorandum of agreement signed by the SHPO that is produced when a project triggers Section 106; or any proposal for such an agreement in which the SHPO concurs in writing (see 36 CFR 800; also see Programmatic Agreement). Under the NHPA, if it is determined that a federal undertaking will have an adverse effect on a property listed or eligible for listing in the National Register of Historic Places, avoidance, minimization, or mitigation of the adverse effect must be considered before the project can go forward. Typically, the Advisory Council on Historic Preservation (ACHP) and its applicant or licensee enter into a Memorandum of Agreement (MOA) with the SHPO and other consulting parties setting forth agreed-upon mitigation measures.

- V. NPS. (National Park Service) The bureau of the Department of the Interior through which the Secretary of the Interior administers the National Historic Preservation Program.
- W. National Register Criteria. The established criteria for evaluating the eligibility of properties for inclusion in the National Register of Historic Places.
- X. No Adverse Effect. The finding of a Section 106 review that a proposed federal project will not adversely affect historic properties located within the impact area of the project. See 36 CFR 800.
- Y. No Effect on Properties. The finding of a Section 106 review that there is no effect on historic properties that are or may be located within the impact area of a proposed project. See 36 CFR 800.
- Z. Nonconforming Intrusion. Any building, structure, or addition that has a high degree of incongruity with the setting of a historic property, thus producing a negative visual effect detrimental to the cohesiveness of the property or historic district.
- AA. Preservation. The act or process of applying measures necessary to sustain the existing form, integrity, and materials of a historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project. [Protection and Stabilization have been consolidated under this treatment].
- BB. Reconstruction. The act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.
- CC. Rehabilitation. The act or process of returning a property to a state of utility through repair or alteration that makes possible an efficient contemporary use while preserving those features of the property that are significant to its historical, architectural, and cultural values.
- DD. Rehabilitation Guide. Standards developed to assist in preservation or restoration of the historic architectural qualities of buildings, structures, and sites.

- EE. Renovation. The modernization of a historic building in which inappropriate alterations are made and important features and details are eliminated.
- FF. Research design. A statement of proposed identification, documentation, investigation, or other treatment of a historic property that identifies the project's goals, methods, and techniques, expected results, and the relationship of the expected results to other proposed activities or treatments.
- GG. Restoration. The act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period in time by means of removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical, and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.
- HH. Significance. The meaning or value ascribed to a historic property or district based on the National Register criteria for evaluation.
- II. Site. The location of a significant event, a prehistoric or historic occupation or activity, landscape or traditional cultural property, or a building or structure, whether standing, ruined, or vanished, where the location itself maintains historical or archeological value regardless of the value of any existing structure.
- JJ. State Historic Preservation Officer (SHPO). The State Historic Preservation Officer administers the national historic preservation program at the state level, reviews National Register of Historic Places nominations, maintains data on historic properties that have been identified but not yet nominated, and consults with federal agencies during Section 106 review. The SHPO is designated by the governor of a state or territory. Federal agencies seek the views of the appropriate SHPO when identifying historic properties and assessing effects of an undertaking on historic properties.
- KK. Structure. A man-made construction built for purposes other than shelter. It can be an engineering project that is large in scale, such as a bridge or tunnel.
- LL. Stabilization. The act or process of applying measures designed to reestablish the weather-resistance of a structure and its stability while maintaining the form as it currently exists [consolidated as part of Preservation].
- MM. Surplus (Redundant) Property. Any building or site no longer needed for the use for which it was originally built.
- NN. Tribal Historic Preservation Officer (THPO). A THPO is defined as those tribes that have assumed SHPO responsibilities on their tribal lands and have been certified pursuant to Section 101(d)(2) of the NHPA.
- OO. Tribal Lands. As defined in Section 301(14) of the Act, tribal lands include: (a) all lands within the exterior boundaries of any Indian Reservation; and (b) all dependent Indian communities.
- PP. Tribal Register. A list of tribal properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization.

- QQ. **Undertaking.** A project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including: (a) those carried out by or on behalf of the agency; (b) those carried out with federal financial assistance; (c) those requiring a federal permit, license, or approval; and (d) those subject to state or local regulation administered pursuant to a delegation or approval by a federal agency. See 36 CFR 800.

1.04 STANDARDS AND GUIDELINES FOR HISTORIC PRESERVATION

The portions of the Secretary of Interior's Standards for the Treatment of Historic Properties and Guidelines for Rehabilitating Historic Buildings are featured in this section. For the complete standards and guidelines, refer to the publication available from the NPS.

- A. **Standards for Preservation.** The Secretary of the Interior's Standards and Guidelines are the basic criteria for preservation of historic properties. Below are the eight Standards for Preservation.
1. A property will be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces, and spatial relationships. Where a treatment and use have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.
 2. The historic character of a property will be retained and preserved. The replacement of intact or repairable historic materials, or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
 3. Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate, and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.
 4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
 5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
 6. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color, and texture.
 7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
 8. Archaeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
- B. **Standards for Rehabilitation.** The Secretary of the Interior's Standards and Guidelines are the basic criteria against which restoration and rehabilitation procedures are reviewed. They also determine whether or not certification by the NPS can be granted (for those projects where certification is required). The express goal of the Standards and Guidelines

is retention of the building's existing form, features, and detailing. The Standards are to be utilized during rehabilitation/repair of historic properties. The 10 Standards for Rehabilitation are listed below (it should be noted that the online version of The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstruction Historic Buildings lists the first eight standards):

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in a such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

- C. **Guidelines for Rehabilitating Historic Buildings.** Initially developed in 1977, these Guidelines were developed to assist property owners, developers, and federal managers to apply the Secretary of the Interior's Standards for Rehabilitation during project planning by providing general design and technical recommendations. Unlike the Standards, the Guidelines are not codified as program requirements. Together, the Standards and

Guidelines provide a model process for owners, developers, and federal agencies to follow. The Guidelines are listed below in the order in which they are to be followed:

1. **Identify, Retain, and Preserve Historic Material and Features:** Guidance for the treatment Rehabilitation begins with recommendations to identify the form and detailing of those architectural materials and features that are important in defining the building's historic character and which must be retained in order to preserve that character. Guidance on identifying, retaining, and preserving character-defining features is always given first. The character of a historic building may be defined by the form and detailing of the materials and features.
2. **Protect and Maintain Historic Materials and Features:** Protection involves the least degree of intervention possible, followed by general maintenance of historic material.
3. **Repair Historic Materials and Features:** When the physical condition of character-defining features warrants additional work, repair is recommended. Guidance for repair begins with the least degree of intervention possible. Repairing by stabilizing, consolidating, and conserving such as patching, splicing, and reinforcing materials following recognized preservation methods is recommended.
4. **Replace Deteriorated Historic Materials and Features:** When repair is inadequate, the limited replacement of extensively deteriorated or missing parts of features when surviving prototypes exist and/or replacement of an entire character-defining feature with new material due to the level of deterioration or damage of materials that precludes repair. Replacement is appropriate when the essential form and detailing are still evident so that the physical evidence can be used to re-establish the feature as an integral part of the rehabilitation project. The preferred option is always replacement of the entire feature in kind with the same material. When this approach may not be technically or economically feasible, compatible substitute materials may be considered.
5. **Design for the Replacement of Missing Historic Features:** When an entire feature (interior or exterior) is missing, it no longer plays a role in physically defining the historic character of the building unless it can be accurately recovered in form and details through the process of carefully documenting the historical appearance.
 - a. The first or preferred action is recovery of the feature. When adequate historical, pictorial, and physical documentation exists so that the feature may be accurately reproduced, and it is desirable to reestablish the feature as part of the building's historical appearance, and then design and construct a new feature based on the documentation.
 - b. The second option is to replace the feature with a new design that is compatible with the remaining character-defining features of the property. The new design should take into account the size, scale, and material of the historic building and, most importantly, should be clearly differentiated so that a false historical appearance is not created.
6. **Alterations/Additions to Historic Properties (for the New Use):** Such alterations should not radically change, obscure, or destroy character-defining spaces, materials, features, or finishes. Guidelines recommend that construction of exterior additions be avoided, if possible, and considered only after it is determined that no other viable option exists.

Additions should be designed and constructed to be clearly differentiated from the historic building so that the character-defining features are not radically changed, obscured, damaged, or destroyed.

7. Energy Efficiency, Accessibility Considerations, Health and Safety Code Considerations: This type of work is not part of the overall process of protecting or repairing character-defining features; rather such work is assessed for its potential negative impact on a building's historic character. For this reason, particular care must be taken not to radically change, obscure, damage, or destroy character-defining materials or features in the process of rehabilitation work to meet code and energy requirements. For information on rehabilitation and preservation technology, contact the appropriate preservation office of the National Park in your area.

D. Standards for Restoration.

1. A property will be used as it was historically or be given a new use which reflects the property's restoration period.
2. Materials and features from the restoration period will be retained and preserved. The removal of materials or alteration of features, spaces, and spatial relationships that characterize the period will not be undertaken.
3. Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate and conserve materials and features from the restoration period will be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.
4. Materials, features, spaces, and finishes that characterize other historical periods will be documented prior to their alteration or removal.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize the restoration period will be preserved.
6. Deteriorated features from the restoration period will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials.
7. Replacement of missing features from the restoration period will be substantiated by documentary and physical evidence. A false sense of history will not be created by adding conjectural features, features from other properties, or by combining features that never existed together historically.
8. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
9. Archeological resources affected by a project will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
10. Designs that were never executed historically will not be constructed.

1.05 PRESERVATION ORGANIZATIONS AND ABBREVIATIONS

- A. The following is a brief list of abbreviations and organizations with that are associated with historic preservation and/or provide information regarding preservation policies and practices:
1. ACHP – Advisory Council on Historic Preservation
 2. AIC – American Institute for the Conservation of Historic and Artistic Works
 3. ASLH – Association for State and Local History
 4. APT – Association for Preservation Technology
 5. FPI – Federal Preservation Institute
 6. HABS – Historic American Buildings Survey
 7. HAER – Historic American Engineering Record
 8. HALS – Historic American Landscape Survey
 9. HBIA -- Historic Building Inspectors Association
 10. NACP – National Alliance of Preservation Commissions
 11. NCPTT – National Center for Preservation Technology and Training
 12. NCSHPO – National Council of State Historic Preservation Officers
 13. NHL – National Historic Landmark
 14. NPI – National Preservation Institute
 15. NPS – National Park Service
 16. NR – National Register of Historic Places
 17. NTHP – National Trust for Historic Preservation
 18. PTN – Preservation Trades Network
 19. SHPO – State Historic Preservation Officer
 20. THPO – Tribal Historic Preservation Officer

1.06 REFERENCES

- A. *The Secretary of the Interior's Standards for Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings.* (36 CFR 68) U.S. Department of the Interior. National Park Service. Washington, D.C. 1995. Available at the National Park Service (NPS) website at <http://www.nps.gov/history/hps/tps/standards_guidelines.htm>.
- B. Preservation Briefs, National Park Service, Technical Preservation Services. Available online at <<http://www.nps.gov/history/hps/tps/briefs/presbhom.htm>>.
- C. *Maintaining Historic Buildings: An Annotated Bibliography.* Compiled by Kaye Ellen Simonson. U.S. Department of the Interior. National Park Service. Washington, D.C. 1990.
- D. Preservation Tech Notes, National Park Service, Technical Preservation Services. Available online at <<http://www.nps.gov/history/hps/tps/technotes/tnhome.htm>>.
- E. U.S. General Services Administration Historic Preservation Technical Procedures.

1.07 DEFINITIONS – GENERAL

- A. General Explanation: specification language often includes terms that are defined elsewhere in the Contract Documents, including the Construction Contract Clauses. Certain terms are defined in this section. These definitions or explanations are not necessarily complete or exclusive, but are general for the work and may be explained more explicitly in other sections.
- B. General Conditions: refer collectively to the Construction Contract Clauses, Labor Standards, and the U.S. Department of Labor Wage Decision bound into the specifications.
- C. Special Conditions: refer collectively to “Supplementary Conditions” bound into the specifications.
- D. Indicated: refers to graphic representations, notes or schedules on the Drawings, or to requirements elsewhere in the specifications or other contract documents. Terms such as “shown,” “noted,” “scheduled,” and “specified” have the same meaning as “indicated” and are used to further help locate the reference, but no limitation on location is intended except as specifically stated.
- E. Where directed, authorized, selected, approved, or a similar term is used in conjunction with the Contractor’s submittals, applications, requests and other activities, and the specifications state that an individual other than the Contracting Officer, such as the Architect or Construction Engineer, shall provide this action, it is understood that only the Contracting Officer has this authority unless the individual stated is so authorized in writing by the Contracting Officer.
 - 1. When the individual is so authorized by the Contracting Officer, the Contractor may still appeal the action to the Contracting Officer.
 - 2. The Contracting Officer’s decision will be final.
 - 3. In no case shall the Contracting Officer’s action be interpreted as releasing the Contractor from responsibility to fulfill the requirements of the contract documents.
- B. Regulations: include laws, codes, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- C. Project site: refers to the space available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing other work.
- D. Furnish: means to supply and deliver to the project site, ready for unloading, unpacking, assembling, installation, and similar operations.
- E. Install: describes operations at the project site, including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- F. Provide: means to furnish and install, complete in place and ready for full use.

- G. Cutting: refers to removal of material by cutting, sawing, drilling, breaking, chipping, grinding, excavating, and similar operations.
- H. Patching: refers to restoration of a surface to its original completed condition by filling, repairing, refinishing, closing, and similar operations.
- I. Installer: is the Contractor or another entity engaged by the Contractor, either directly or indirectly through subcontracting, to perform a particular construction operation at the project site, including installation, erection, application, and similar operations. Installers shall be skilled in the operations they perform. Where indicated, installers shall also be Specialists as defined in the Construction Contract Clauses.
- J. Testing agency or testing laboratory: is an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report the results of those inspections and tests.
- K. Owner: refers to the government.
- L. Building Manager: is the government employee responsible for the administration, operation and maintenance of the building.
- M. Construction Manager: is the individual or entity, under Contract to the government, responsible for performing the day-to-day coordination and administration of the construction Contract, including performing field inspections, recommending approval or rejection of material and workmanship, monitoring labor and safety provisions, maintaining inspection logs and records of defects, and similar activities.
- N. Notice to Proceed: is the Contracting Officer's notification by letter to the Contractor to proceed with the Contract, activating the time period for construction and establishing the completion date.

1.08 DRAWING SYMBOLS

- A. Except as otherwise indicated, symbols used on the drawings are those symbols recognized in the construction industry for the purposes. These include graphic symbols defined by *Architectural Graphic Standards*, published by John Wiley & Sons, Inc., ninth edition, as well as graphic symbols recommended by ASHRAE, ASME, ASPE, CSI, IEEE and similar technical organizations for mechanical and electrical drawings. Refer uncertainties as to meaning of symbols to the Contracting Officer for clarification before proceeding.

1.09 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect, to the extent referenced, as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference.
- B. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantity or quality, comply with the most stringent requirement. Immediately refer uncertainties, and

requirements that are different but apparently equal, to the Contracting Officer in writing for a decision before proceeding.

- C. Minimum Quantity and Quality: The quantity or quality indicated shall be the minimum provided by the Contractor. The actual installation may comply exactly with the minimum quantity or quality indicated, or it may exceed the minimum levels within reasonable limits.
1. Indicated numeric values are minimum or maximum as appropriate for the context of the requirements.
 2. Refer uncertainties to the Contracting Officer for a decision before proceeding.
- D. Abbreviations: Names and titles of standards are frequently abbreviated. Abbreviations and acronyms used in the Specifications and other Contract Documents mean the recognized name of a trade association, standards-producing organization, and authority having jurisdiction or other entity applicable to the context of the particular provision. Except as otherwise indicated, refer to the current editions of the following publications for abbreviations:

Encyclopedia of Associations: National Organizations of the U.S. Gale Research.

National Trade and Professional Associations of the United States. Columbia Books.

Means Illustrated Construction Dictionary - New Unabridged Edition. R.S. Means Company, Inc.

1. AA - Aluminum Association
2. AABC - Associated Air Balance Council
3. AAMA - American Architectural Manufacturers Association
4. AAN - American Association of Nurserymen (see ANLA)
5. AASHTO - American Association of State Highway and Transportation
6. AATCC - American Association of Textile Chemists and Colorists
7. ABMA - American Bearing Manufacturers Association
8. ABMA - American Boiler Manufacturers Association
9. ACI - American Concrete Institute
10. ACIL - American Council of Independent Laboratories -
11. The Association of Independent Scientific, Engineering, and Testing Firms
12. ACPA - American Concrete Pipe Association
13. ADC - Air Diffusion Council
14. AEIC - Association of Edison Illuminating Companies
15. AFBMA - Anti-Friction Bearing Manufacturers Association (see ABMA)
16. AFPA - American Forest and Paper Association
17. AGA - American Gas Association
18. AHA - American Hardboard Association
19. AHAM - Association of Home Appliance Manufacturers
20. AI - Asphalt Institute
21. AIA - The American Institute of Architects

22. AIA - American Insurance Association
23. AIHA - American Industrial Hygiene Association
24. AISC - American Institute of Steel Construction
25. AISI - American Iron and Steel Institute
26. AITC - American Institute of Timber Construction
27. ALA - American Laminators Association (see LMA)
28. ALCA - Associated Landscape Contractors of America
29. ALI - Associated Laboratories, Inc.
30. ALSC - American Lumber Standards Committee
31. AMCA - Air Movement and Control Association International, Inc.
32. ANLA - American Nursery and Landscape Association
33. ANSI - American National Standards Institute
34. AOAC - Association of Official Analytical Chemists International
35. AOSA - Association of Official Seed Analysts
36. APA - American Plywood Association (see EWA)
37. APA - Architectural Precast Association
38. API - American Petroleum Institute
39. ARI - Air-Conditioning and Refrigeration Institute
40. ARMA - Asphalt Roofing Manufacturers Association
41. ASA - Acoustical Society of America
42. ASC - Adhesive and Sealant Council
43. ASCA - Architectural Spray Coaters Association
44. ASCE - American Society of Civil Engineers
45. ASHES - American Society for Healthcare Environmental Services - Division of the American Hospital Association
46. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers.
47. ASLA - American Society of Landscape Architects
48. ASME - American Society of Mechanical Engineers
49. ASPA - American Sod Producers Association (see TPI)
50. ASPE - American Society of Plumbing Engineers
51. ASQ - American Society for Quality
52. ASSE - American Society of Sanitary Engineering
53. ASTM - American Society for Testing and Materials
54. ATIS - Alliance for Telecommunications Industry Solutions
55. AWCI - Association of the Wall and Ceiling Industries International
56. AWCMA - American Window Covering Manufacturers Association (see WCMA)
57. AWI - Architectural Woodwork Institute
58. AWPA - American Wood-Preservers' Association
59. AWS - American Welding Society
60. AWWA - American Water Works Association
61. BAC - Brick Association of the Carolinas
62. BHMA - Builders Hardware Manufacturers Association
63. BIA - Brick Industry Association

64. BIFMA - The Business and Institutional Furniture Manufacturer's Association International
65. CABO - Council of American Building Officials
66. CAGI - Compressed Air and Gas Institute
67. CAUS - Color Association of the United States
68. CBHF - State of California, Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation Technical Information
69. CBMA - Certified Ballast Manufacturers Association
70. CCC - Carpet Cushion Council
71. CDA - Copper Development Association, Inc.
72. CE - Corps of Engineers (U.S. Department of the Army)
73. CFFA - Chemical Fabrics & Film Association, Inc.
74. CFR - Code of Federal Regulations (Publications available from the Government Printing Office)
75. CGA - Compressed Gas Association
76. CGSB - Canadian General Standards Board
77. CISCA - Ceilings and Interior Systems Construction Association
78. CISPI - Cast Iron Soil Pipe Institute
79. CLFMI - Chain Link Fence Manufacturers Institute
80. CPA - Composite Panel Association
81. CPPA - Corrugated Polyethylene Pipe Association
82. CPSC - Consumer Product Safety Commission
83. CRI - Carpet and Rug Institute
84. CRSI - Concrete Reinforcing Steel Institute
85. CS - Commercial Standard (U.S. Department of Commerce)
86. CSI - Construction Specifications Institute
87. CSSB - Cedar Shake and Shingle Bureau
88. CTI - Ceramic Tile Institute of America
89. CTI - Cooling Tower Institute
90. DASMA - Door and Access Systems Manufacturers Association, International
91. DHI - Door and Hardware Institute
92. DIPRA - Ductile Iron Pipe Research Association
93. DOC - Department of Commerce (Publications available from the Government Printing Office)
94. DOT - Department of Transportation
95. ECSA - Exchange Carriers Standards Association (see ATIS)
96. EIA - Electronic Industries Association
97. EIMA - EIFS Industry Members Association
98. EJMA - Expansion Joint Manufacturers Association
99. EPA - Environmental Protection Agency
100. ETL - ETL Testing Laboratories Inc. (see ITS)
101. EWA - Engineered Wood Association
102. FAA - Federal Aviation Administration
103. FCC - Federal Communications Commission

104. FCI - Fluid Controls Institute
105. FCICA - Floor Covering Installation Contractors Association
106. FDA - Federal Drug Administration
107. FGMA - Flat Glass Marketing Association (see GANA)
108. FHA - Federal Housing Administration (U.S. Department of Housing and Urban Development)
109. FM - Factory Mutual System
110. FS - Federal Specification (publications available from GSA)
111. GA - Gypsum Association
112. GANA - Glass Association of North America
113. GRI - Geosynthetic Research Institute
114. GSA - General Services Administration
115. HEI - Heat Exchange Institute
116. HFES - Human Factors and Ergonomics Society
117. HI - Hydraulic Institute
118. HI - Hydronics Institute - Division of Gas Appliance Manufacturers Association
119. HMA - Hardwood Manufacturers Association
120. HPVA - Hardwood Plywood and Veneer Association
121. IAS - International Approval Services - Division of Canadian Standards Association
122. IBD - Institute of Business Designers (see IIDA)
123. ICEA - Insulated Cable Engineers Association
124. IEC - International Electrotechnical Commission (publications available from ANSI)
125. IEEE - Institute of Electrical and Electronics Engineers
126. IESNA - Illuminating Engineering Society of North America
127. IGCC - Insulating Glass Certification Council
128. IIDA - International Interior Design Association
129. ILI - Indiana Limestone Institute of America
130. IMSA - International Municipal Signal Association
131. INCE - Institute of Noise Control Engineering
132. IRI - HSB Industrial Risk Insurers
133. ISA - International Society for Measurement and Control
134. ISEA - Industrial Safety Equipment Association
135. ISS - Iron and Steel Society
136. ITS - Intertek Testing Services
137. KCMA - Kitchen Cabinet Manufacturers Association
138. LGSi - Light Gage Structural Institute
139. LIA - Lead Industries Association, Inc.
140. LMA - Laminating Materials Association
141. LPI - Lightning Protection Institute
142. MBMA - Metal Building Manufacturers Association
143. MCAA - Mechanical Contractors Association of America
144. MFMA - Maple Flooring Manufacturers Association

145. MFMA - Metal Framing Manufacturers Association
146. MHIA - Material Handling Industry Association
147. MIA - Marble Institute of America
148. MIA - Masonry Institute of America
149. MIL - Military Standardization Documents (U.S. Department of Defense)
150. ML/SFA - Metal Lath/Steel Framing Association
151. MRCA - Midwest Roofing Contractors Association
152. MS – Military Standardized Documents
153. MSS - Manufacturers Standardization Society of the Valve and Fittings Industry
154. NAA - National Arborist Association
155. NAAMM - National Association of Architectural Metal Manufacturers
156. NAAMM - North American Association of Mirror Manufacturers (see GANA)
157. NACE - National Association of Corrosion Engineers International
158. NAGDM - National Association of Garage Door Manufacturers (see DASMA)
159. NAIMA - North American Insulation Manufacturers Association
160. NAMI - National Accreditation & Management Institute, Inc.
161. NAPA - National Asphalt Pavement Association
162. NBHA - National Builders Hardware Association (see DHI)
163. NBGQA - National Building Granite Quarries Association, Inc.
164. NCAC - National Council of Acoustical Consultants
165. NCCA - National Coil Coaters Association
166. NCMA - National Concrete Masonry Association
167. NCPI - National Clay Pipe Institute
168. NCRPM - National Council on Radiation Protection and Measurements
169. NCSPA - National Corrugated Steel Pipe Association
170. NEBB - Natural Environmental Balancing Bureau
171. NECA - National Electrical Contractors Association
172. NEI - National Elevator Industry
173. NELMA - Northeastern Lumber Manufacturers Association
174. NEMA - National Electrical Manufacturers Association
175. NETA - InterNational Electrical Testing Association
176. NFPA - National Fire Protection Association
177. NFPA - National Forest Products Association (see AFPA)
178. NFRC - National Fenestration Rating Council Incorporated
179. NGA - National Glass Association
180. NHLA - National Hardwood Lumber Association
181. NIA - National Insulation Association
182. NIAC - National Insulation and Abatement Contractors Association (see NIA)
183. NIST - National Institute of Standards and Technology (U.S. Department of Commerce)
184. NKCA - National Kitchen Cabinet Association (see KCMA)
185. NLGA - National Lumber Grades Authority
186. NOFMA - National Oak Flooring Manufacturers Association
187. NPA - National Parking Association

188. NPCA - National Paint and Coatings Association
189. NRCA - National Roofing Contractors Association
190. NRMCA - National Ready Mixed Concrete Association
191. NSA - National Stone Association
192. NSF - National Sanitation Foundation International
193. NSSEA - National School Supply and Equipment Association
194. NTMA - National Terrazzo and Mosaic Association
195. NUSIG - National Uniform Seismic Installation Guidelines
196. NWMA - National Woodwork Manufacturers Association (see NWWDA)
197. NWWDA - National Wood Window and Door Association
198. OSHA - Occupational Safety and Health Administration (U.S. Department of Labor)
199. PATMI - Powder Actuated Tool Manufacturers' Institute
200. PCA - Portland Cement Association
201. PCI - Precast/Prestressed Concrete Institute
202. PDCA - Painting and Decorating Contractors of America
203. PDI - Plumbing and Drainage Institute
204. PEI - Porcelain Enamel Institute
205. PGI - Polyvinylchloride Geomembrane Institute - Technology Program, University of Illinois-Urbana Champaign
206. PIMA - Photographic and Imaging Manufacturers Association
207. PPFA - Plastic Pipe and Fittings Association
208. PPI - Plastics Pipe Institute (The Society of the Plastics Industry, Inc.)
209. PS - Product Standards of the National Bureau of Standards (U.S. Department of Commerce)
210. RCMA - Roof Coatings Manufacturers Association Center Park
211. RCSC - Research Council on Structural Connections
212. Sargent & Lundy
213. RFCI - Resilient Floor Covering Institute
214. RMA - Rubber Manufacturers Association
215. RUS - Rural Utilities Service
216. SAE - Society of Automotive Engineers International
217. SDI - Steel Deck Institute
218. SDI - Steel Door Institute
219. SEFA - Scientific Equipment and Furniture Association
220. SEGD - Society for Environmental Graphic Design
221. SGCC - Safety Glazing Certification Council
222. SHLMA - Southern Hardwood Lumber Manufacturers Association (see HMA)
223. SIGMA - Sealed Insulating Glass Manufacturers Association
224. SJI - Steel Joist Institute
225. SMA - Screen Manufacturers Association
226. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association
227. SPI - The Society of the Plastics Industry, Inc.
228. SPIB - Southern Pine Inspection Bureau

- 229. SPRI - Single Ply Roofing Institute
- 230. SSINA - Specialty Steel Industry of North America
- 231. SSPC - Steel Structures Painting Council - The Society for Protective Coatings
- 232. SSPMA - Sump and Sewage Pump Manufacturers Association
- 233. STI - Steel Tank Institute
- 234. SWI - Steel Window Institute
- 235. SWPA - Submersible Wastewater Pump Association
- 236. SWRI - Sealant, Waterproofing and Restoration Institute
- 237. TCA - Tile Council of America
- 238. TFS - Texas Forest Service
- 239. TIMA - Thermal Insulation Manufacturers Association (see NAIMA)
- 240. TPI - Truss Plate Institute
- 241. TPI - Turfgrass Producers International
- 242. TRB - Transportation Research Board - National Research Council
- 243. UFAC - Upholstered Furniture Action Council
- 244. UL - Underwriters Laboratories, Inc.
- 245. UNI - Uni-Bell PVC Pipe Association
- 246. USDA - U.S. Department of Agriculture
- 247. USITT - U.S. Institute of Theater Technology - The American Association of Design and Production Professionals in the Performing Arts
- 248. USP - U.S. Pharmacopeia
- 249. USPS - U.S. Postal Service
- 250. WA - Wallcoverings Association
- 251. WASTEC - Waste Equipment Technology Association
- 252. WCLIB - West Coast Lumber Inspection Bureau
- 253. WCMA - Window Covering Manufacturers Association
- 254. WEF - Water Environment Federation
- 255. WIC - Woodwork Institute of California
- 256. WMMPA - Wood Moulding & Millwork Producers Association
- 257. WPCF - Water Pollution Control Federation (see WEF)
- 258. WRI - Wire Reinforcement Institute
- 259. WSC - Water Systems Council
- 260. WSFI - Wood and Synthetic Flooring Institute (see MFMA)
- 261. WWPA - Western Wood Products Association

E. PRODUCTS (Not applicable)

F. EXECUTION (Not applicable)

END OF SECTION

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This specification has been developed for use on historic properties (defined as any district, site, building, structure, or object that is listed in or eligible for listing in the National Register of Historic Places) and provides an overview of accepted practices. Site-specific specifications, when appropriate, will be provided by the Architect.
- B. All work described herein and related work must conform to the Secretary of the Interior's Standards for the Treatment of Historic Properties.
- C. The Contractor shall provide all labor, materials, equipment, and operations required to complete the rehabilitation work indicated herein.
- D. All work described herein and related work must have the approval of a Cultural Resources Manager, Conservator, Historic Architect, or other professional who meets the standards outlined in the Secretary of the Interior's Standards – Professional Qualifications Standards pursuant to 36 CFR 61. Such person is referred to in this document as the *Architect*.

1.02 SECTION INCLUDES

- A. Removal of mortar joints
- B. Repointing

1.03 RELATED SECTIONS

- A. Section – 04100.02 Preparation of Lime and Cement-Amended Mortars
- B. Section – 04211 Historic Brick
- C. Section – 04214 Terra Cotta and Ceramics
- D. Section – 04500 Masonry Restoration
- E. Section – 04720 Historic Cast Stone

1.04 REFERENCES

- A. Repointing shall conform to *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings*, available at the National Park Service (NPS) website at <http://www.nps.gov/history/hps/tps/standards_guidelines.htm>.
- B. Techniques employed for repointing shall be as outlined in *Preservation Brief No. 2: Repointing Masonry Joints in Historic Masonry Buildings*, available online at the NPS website at <<http://www.nps.gov/history/hps/tps/briefs/brief02.htm>>.

- C. U.S. General Services Administration Historic Preservation Technical Procedures for mortar, available online at
<http://www.gsa.gov/gsa/cm_attachments/GSA_DOCUMENT/Preservation_Note_01_R2RQ4-y_0Z5RDZ-i34K-pR.doc>;
<<http://w3.gsa.gov/web/p/hhttp.nsf/a533f1f859737bc9852565cc0058d0b6/7de342045d4c63f6852565c50054b3a7?OpenDocument>>; and
<<http://w3.gsa.gov/web/p/hhttp.nsf/a533f1f859737bc9852565cc0058d0b6/e7518da3d776f026852565c50054b3c5?OpenDocument>>.
- D. Masonry restoration work shall comply with ACI / ASCE 530.1-88. Contractor shall maintain at least one copy of ACI / ASCE 530.1-88 on site.

1.05 SUBMITTALS

The Contractor will submit a detailed schedule of the areas to be repointed, including an assessment of the problem areas and a detailed procedure for repointing, to the Architect for approval.

1.06 QUALITY ASSURANCE

- A. Work Experience: The Contractor to perform the work in this section shall have a minimum of five (5) years experience in the repointing of historic masonry. He/she shall demonstrate a working knowledge of the Secretary of the Interior's Standards for Guidelines for Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings.
- B. Mortar removal will be undertaken by an experienced mason. The mason operating power or mechanical tools shall have demonstrated proficiency with the tools prior to approved use by the Architect. The Mason/operator using the equipment must have a minimum of five (5) years experience and demonstrated expertise in their proper use on historic structures.

1.07 MOCK-UPS

- A. The Contractor shall prepare mock-up installations prepared with each of the removal methods and tools that will be used for this Work at locations selected by the Architect. Test panels should not be undertaken in areas that are highly visible. Use of power and mechanical tools shall be approved by the Architect.
- B. The Contractor shall prepare two mock-up installations of each type of masonry joint style and mortar color to be installed at locations selected by the Architect. If cleaning tests are also to take place, test panels should be placed in the same area. Test panels should not be undertaken in areas that are highly visible. Each test panel shall be executed in the same manner as the final installation. Mock-ups will be reviewed after the mortar removal and again after completion of repointing. Test panels shall be a minimum area 3x3 feet for brick facades, and larger for stone facades. Test panels will be inspected for color, texture, and installation technique.
- C. The Contractor shall prepare up to three additional mock-ups of each mortar, joint type, and mortar color without further compensation. Approved test area(s) shall become part of the work and shall serve as the quality standard for all subsequent work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered to the site in original packaging, unopened, with manufacturer's name and product identification thereon. Cementitious materials shall be protected from contamination by foreign matter and deterioration by moisture or temperature. Contaminated or deteriorated material shall not be used. Products stored longer than six (6) months shall not be used.
- B. Masonry materials shall be stored in such a manner as not to interfere with the operation and daily maintenance of the facility. Proposed storage locations shall be approved by the Owner prior to the delivery of materials. Masonry materials shall not be stored inside the building.

1.09 PROJECT / SITE CONDITIONS

- A. The normal temperature range for the work of this Section shall be when the air and surface temperatures are 40 degrees F and rising, or less than 90 degrees F and falling. When temperatures are expected to fall outside this range, the Contractor shall employ hot and cold weather procedures as published by the Masonry Institute of America.
- B. The Contractor is responsible for protecting existing adjacent materials and surfaces during the execution of the work, and shall provide all necessary protection and follow all necessary work procedures to avoid damage to existing material assemblies not a part of the work in the Section.
- C. The Contractor shall provide visible barriers and / or warning tape around the perimeter of the work area for visitor protection and shall also provide that nearby vehicles and adjacent structures will be protected from damage during the course of the work.
- D. The Contractor shall coordinate masonry repointing with the other trades involved in exterior and interior restoration work, including but not limited to masonry cleaning, sealing, and painting.

PART 2 – PRODUCTS

2.01 EQUIPMENT FOR RAKING AND REPOINTING

- A. Equipment for raking joints:
 - 1. Traditional Method: Hand chisels and mash hammers
 - 2. Modern Method: Power tools including small pneumatically-powered chisels, scaler (power chipper), and thin diamond-bladed grinders. Power saws are not recommended.
- B. Equipment for repointing:
 - 1. Mortar pan mill or equipment for mortar mixing
 - 2. Plastic buckets, hoe, wooden mallet or ax handle

3. Mortar board, hawk, trowels, pointing rod
4. Natural bristle or nylon brushes (metal bristle brushes are NOT to be used)

2.02 MORTAR SELECTION CRITERIA: See Sections 04100.02 and 04400.01.

- A. Repair mortar shall match the color, texture, and tooling of the existing pointing.
- B. Sand shall match the sand of the historic mortar.
- C. Mortar shall have greater vapor permeability and be softer, measured in compressive strength, than the masonry units.
- D. Mortar shall be as vapor permeable and be as soft or softer, measured in compressive strength, than the existing historic mortar.

PART 3 - EXECUTION

3.01 GENERAL

- A. The restoration methods and materials selected for a specific structure shall take into account the total construction system of the building to be worked upon, including different masonry and mortar materials, as well as non-masonry elements that may be affected by the work.
- B. The extent of the repointing, whether partial or sectional repointing, complete facades or features, or total structure or building, shall be reviewed by the Architect on site prior to beginning operations. The Contractor shall submit a repointing schedule, including methods and materials to be used for approval before work starts.
- C. The Contractor shall complete a survey of the condition of the mortar and masonry:
 1. Existing general masonry failures that contribute mortar losses shall be noted and should be scheduled for repair prior to repointing.
 2. Analysis of mortar type and color shall be conducted, the extent and type of analysis to be determined by the Architect.
- D. The Contractor shall protect adjacent materials, installed non-masonry materials, and openings.
- E. Manufacturer's instructions for mixing and installation of masonry and equipment shall be followed. Masonry shall conform to ASTM C 270.
- F. Masonry cleaning shall be completed prior to beginning raking and repointing work.

3.02 SYSTEM FOR JOINT REMOVAL

- A. The areas selected for repointing, if partial or selective repointing is to be done, shall be designated and marked off.

B. Removal Methods:

1. Traditional Method: removal of mortar by hand with a hand chisel and mash hammer. This method produces the least damage and is preferred for masonry with thin joints and brick.
2. Modern Method: removal with power tools such as pneumatic chisels and grinders. Power saws are not recommended for use on most brick walls or thin joints. Small pneumatically powered chisels are generally effective for use on historic buildings, providing the operator is skilled. Grinders with thin diamond blades can be used for horizontal joints on hard portland cement mortars.
3. Combined Methods: combined use of power tools and hand chiseling methods are generally recommended and achieve the highest degree of success when properly executed.

C. Specifications for Removal:

1. Mortar shall be removed to a minimum depth of 2 to 2 ½ times the width of the joint but not less than ¾ inch.
2. Chisels and power tools are to be the appropriate size to fit cleanly into mortar joints without damage to surrounding surfaces.
3. Loose or disintegrated mortar beyond the minimum depth shall be removed.
4. Removal of the mortar shall be done in a manner that does not score, chip, or otherwise damage masonry units or adjacent elements.
5. Mortar should be removed cleanly from the masonry units, leaving square corners at the back of the cut.
6. If using a grinder to rake head joints, the Contractor shall switch to the smallest diameter blade possible to make the deepest cut without overrunning the ends of the joint and cutting into the bricks above or below. Top and bottom of the head joints shall be finished with a chisel.
7. Use a hand chisel to finish joints adjacent to door and window openings to avoid damage to frames and trim.
8. If work is found unacceptable, all raking shall cease without additional cost to the Owner until deficiencies in tools, workmanship, or methodology have been corrected to the Architect's satisfaction.

3.03 SYSTEM FOR REPOINTING

A. The Contractor shall inspect all joints to receive mortar prior to commencing work:

1. After removal of the old mortar, joints shall be blown clean with compressed air (40-60 psi) to remove all loose particles and dust.

2. Prior to repointing, joints shall be dampened with low pressure water (100-150 psi). Joints shall be damp with no visible standing water.
3. A continual mist of water shall be applied for a few hours prior to repointing walls of absorbent masonry units such as limestone, sandstone, and common brick.

B. Filling Joints:

1. Fill the deeper areas first, compacting the new mortar in several successive layers.
2. Apply successive amounts of mortar in ¼-inch layers.
3. Allow each layer to harden before application of the next layer.
4. Apply the final layer flush with masonry units, except where old bricks or stones have worn, rounded edges, the final mortar layer should be recessed slightly from the face of the masonry. Do not feather-edge mortar over chipped or damaged edges.

C. Finishing:

1. Allow the final layer to set until “thumb-print hard” and tool to match the historic joint. Proper timing is important for uniform color and appearance of the mortar.
2. Remove excess mortar from the edges of the joints with a natural bristle or nylon brush after mortar has dried but before the mortar is initially set (1-2 hours).

D. Curing:

1. Periodically wet mortar joints after the mortar joints are thumb-print hard and have been tooled (especially important with high-lime content mortars, such as Type O, Type K, and especially Type L). Misting with a hand sprayer with a fine nozzle for one to two days is recommended.
2. Where ambient temperatures exceed 80 degrees F or where wind speeds exceed 20 mph, cover walls with burlap after repointing to keep walls damp and protected from direct sunlight. If plastic is used, it must be tented out and not placed directly against the wall.
3. Allow new mortar to cure for at least 30 days prior to exposure to other repairs, such as masonry cleaning.

3.04 FINAL REPORT

The Contractor shall:

- A. Revisit the site after the new mortar has cured at least 30 days to compare the finish and color of the repair to see if the desired affect has been achieved.
- B. Document the work and finished product with photographs.

- C. Provide a written summary of the project and results upon final inspection and approval. The summary shall outline steps taken or new findings not specified in the initial documentation.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This specification has been developed for use on historic properties (defined as any district, site, building, structure, or object that is listed in or is eligible for listing in the National Register of Historic Places) and provides an overview of accepted practices. Site-specific specifications, when appropriate, will be provided by the Architect.
- B. All work described herein and related work must conform to the Secretary of the Interior's Standards for the Treatment of Historic Properties.
- C. The Contractor shall provide all labor, materials, equipment, and operations required to complete the rehabilitation work indicated herein.
- D. All work described herein and related work must have the approval of a Cultural Resources Manager, Conservator, Historic Architect, or other professional who meets the standards outlined in the Secretary of the Interior's Standards – Professional Qualifications Standards pursuant to 36 CFR 61. Such person is referred to in this document as the *Architect*.

1.02 SECTION INCLUDES

- A. Mortar selection
- B. Preparation of lime mortar
- C. Preparation of cement-amended mortar

1.03 RELATED SECTIONS

- A. Section 04100.01 – Removal of Mortar Joints and Repointing
- B. Section 04211 – Historic Brick
- C. Section 04214 – Terra Cotta and Ceramics
- D. Section 04400.01 – Identifying Masonry Types and Failures
- E. Section 04500 – Masonry Restoration

1.04 REFERENCES

- A. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings*, available at the National Park Service (NPS) website at <http://www.nps.gov/history/hps/tps/standards_guidelines.htm>.
- B. Use and types of mortar are found in *Preservation Brief No. 2: Repointing Masonry Joints in Historic Masonry Building*, available online at the NPS website at <<http://www.nps.gov/history/hps/tps/briefs/brief02.htm>>.

- C. U.S. General Services Administration Historic Preservation Technical Procedures for Mortar, available online at
<<http://w3.gsa.gov/web/p/hptp.nsf/a533f1f859737bc9852565cc0058d0b6/7de342045d4c63f6852565c50054b3a7?OpenDocument>> and
<<http://w3.gsa.gov/web/p/hptp.nsf/a533f1f859737bc9852565cc0058d0b6/e7518da3d776f026852565c50054b3c5?OpenDocument>>.
- D. Weaver, Martin E. *Conserving Buildings: A Manual of Techniques and Materials*. Revised edition. New York: John Wiley & Sons and the Preservation Press, 1997.
- E. ASTM C207, *Standard Specification for Hydrated Lime for Masonry Purposes*.
- F. ASTM C206, *Standard Specification for Finishing Hydrated Lime*.
- G. ASTM C144, *Standard Specification for Aggregate for Masonry Mortar*.
- H. ASTM C150, Type II, *Standard Specification for Portland Cement*.
- I. ASTM C979, *Specification for Pigments for Integrally Pigmented Concrete*.

1.05 SUBMITTALS

- A. The Contractor shall submit a detailed schedule of the areas to be repointed, including an assessment of the problem areas, a historic mortar analysis, and a detailed procedure for repointing, to the Architect for approval:
 - 1. Submit data indicating proportion or property specifications used for mortar.
 - 2. Submit test reports for mortar materials and report proportions resulting from laboratory testing used to select mortar mix.
- B. Product Literature: The Contractor shall submit the manufacturer's product literature to the Architect for all proprietary products specified for repointing. Product literature shall include specification data, Material Safety Data Sheets, and instructions for storage, handling, and use.
- C. Historic Mortar Analysis: The Contractor shall submit the laboratory report from completed mortar analysis. Mortar analysis shall be completed prior to beginning test-panel preparation. Analysis shall be limited to wet chemical and microscopic analysis to characterize the insoluble aggregate, determine binder-aggregate ratio, prepare a mix design for replacement mortar, and identify appropriate sources for sand aggregate.
- D. Samples: No masonry restoration work shall proceed until all samples are approved. The Contractor shall submit samples of the following masonry repair and replacement materials for approval of color and texture match:

Cured pointing mortar. Portable samples shall be prepared using drywall channel or similar material the approximate width of a mortar joint. Once a matching mortar color is achieved, placement of on-site mock-ups may begin.

1.06 QUALITY ASSURANCE

- A. Work Experience: The Contractor to perform the work in this section shall have a minimum of ten (10) years experience with historic mortars and masonry repairs and repointing. He/she shall demonstrate a working knowledge of the Secretary of the Interior's Standards for Guidelines for Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings.
- B. The Contractor shall not change sources or manufacturers of mortar materials during the course of the work.

1.07 MOCK-UPS

- A. The Contractor shall prepare two mock-up installations of each type of masonry and mortar color to be installed at locations selected by the Architect. If cleaning tests are also to take place, test panels should be in the same area. Test panels should not be undertaken in areas that are highly visible.
- B. Each test panel shall be executed in the same manner as the final installation. Test panels shall be a minimum area of 3x3 feet for brick facades, and larger for stone facades.
- C. After the test panels have cured for a period of two to three weeks (or otherwise specified by the Architect), the test panels will be inspected for color, texture, and installation technique.
- D. The Contractor shall prepare up to three additional mock-ups of each mortar and mortar color without further compensation. Approved test area(s) shall become part of the work and shall serve as the quality standard for all subsequent work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall deliver all products to the site in original packaging, unopened and undamaged, with manufacturer's name and product identification visible thereon and manufacturer's instructions and Material Safety Data Sheets.
- B. The Contractor shall store products in a dry location and protected from dampness and freezing following manufacturer's instructions.
- C. The Contractor shall stockpile and handle aggregates in a manner to prevent contamination from foreign materials.

1.09 PROJECT / SITE CONDITIONS

- A. Mortar installation shall be executed only when the air and surface temperatures are 40 degrees F and rising or less than 80 degrees F and falling. Minimum temperature for masonry repointing shall be 50 degrees F and above for at least 2 hours after completion and above freezing for at least 24 hours after completion. Work shall not commence when rain, snow, or below-freezing temperatures are expected within the next 24 hours. All surfaces shall be free of standing water, frost, and ice.
- B. The Contractor is responsible for protecting existing adjacent materials and surfaces during the execution of the work, and will provide all necessary protection and follow all

necessary work procedures to avoid damage to existing material assemblies not a part of the work in the Section.

- C. The Contractor shall provide visible barriers and / or warning tape around the perimeter of the work area for visitor protection, and shall also provide that nearby vehicles and adjacent structures are protected from damage during the course of the work.
- D. Contractor shall coordinate masonry repointing with the other trades involved in exterior and interior restoration work, including but not limited to masonry cleaning, sealing, and painting.

PART 2 - PRODUCTS

2.01 MORTAR SELECTION CRITERIA: See Sections 04100.02 and 04400.01.

- A. Repair mortar shall be compatible with the material, quality, color, and texture of the existing mortar.
- B. Sand shall match the gradation of the historic mortar and be free from impurities. The color, size, and texture of the sand should be similar to the original sand.
- C. Mortar shall have greater vapor permeability and be softer, measured in compressive strength, than the masonry units.
- D. Mortar shall be as vapor permeable and be as soft or softer, measured in compressive strength, than the existing historic mortar.
- E. Testing and Mortar Selection for Masonry Units:
 - 1. Selection of Mortar for Brick Units:
 - a. Identify type and strength of brick.
 - b. Identify the composition, strength, and hardness of the historic mortar.
 - c. Lime and Sand mortars are preferred for historic brick masonry.
 - d. Portland Cement generally should not be used for historic brick.
 - e. Mortar should have a lower compressive (psi) strength than brick.
 - f. Mortar should be harder than the historic mortar.
 - 2. Selection of Mortar for Terra Cotta and Ceramic Units:
 - a. Mortar should have a lower compressive (psi) strength than the terra cotta and ceramic units.
 - b. Hard, portland cements or coarsely screened mortars shall not be used.
 - 3. Selection of Mortar for Adobe Units: Requires special considerations. See Section 04290.

4. Stone:
 - a. Identify type of stone.
 - b. Identify geological and mineralogical nature of stone.
 - c. Identify the Compressive or Crushing Strength of stone both wet and dry: ASTM C170-87.
 - d. Mortar should have a lower compressive (psi) strength than stone: general about 1/3 the compressive or crushing strength of the stone units.
 - e. Hard, portland cements are generally not appropriate for historic mortars.
5. Concrete Block and Cast Stone Units:
 - a. Mortar should have a lower compressive (psi) strength than the masonry units.
 - b. Use of concrete amended mortars.

2.02 MORTAR TYPE AND MIX

- A. Depending on the desired strength and consistency, lime mortars should conform to ASTM C207 and ASTM C206, Mortar for Masonry, such as:
 1. Type M (2,500 PSI): 3:1:12
 2. Type S (1,800 psi): 2:1:9
 3. Type N (750 psi): 1:1:6
 4. Type O (350 psi): 1:2:9
 5. Type K (75 psi): 1:3:11
 6. Type L: 0:1:3

OR

- B. Equivalent mortar that meets comparable federal specifications.

2.03 POINTING MATERIALS AND MIXES (JOB-MIXED MORTAR)

- A. Portland Cement: ASTM C150, Type I, non-staining and without air entrainment. Gray and white Portland Cement may be combined as required to match the desired color.
 1. Non-staining white cement, preferred for historic applications, unless grey cement was used in the original mortar.
 2. Standard grey cement is generally not used for historic masonry.

- B. Hydrated Lime: ASTM C207, Type S.
 - C. Lime Putty (slaked lime): should conform to ASTM C5.
 - D. Sand: ASTM C144, free of clay, silt, soluble salts, and organic matter; shall match the color and texture of the original mortar sand. The Contractor may request from the Architect a sample of the original mortar sand for use in color and texture matching.
 - E. Water: Potable, free from injurious amounts of oil, soluble salts, alkali, acids, organic impurities and other deleterious substances which impair mortar strength or bonding.
 - F. Masonry Cement (premixed, bagged mortar): shall NOT be used.
- 2.04 PRE-MIXED MORTARS: Pre-mixed mortars may be used for repointing. All mortars must be approved by the Architect.
- 2.05 ACCESSORY MATERIALS
- A. Historic Materials include other components that enhance the color and texture matching and may include materials such as crushed oyster shells and animal hair, and historic pigments such as brick dust and lamp black.
 - B. Colorants (if required for exact color match): Non-fading, mineral oxide masonry pigment as approved by the Architect.
 - 1. Pigments should not exceed 10% by weight of the portland cement in the mix.
 - 2. Carbon black should not exceed 2% of the Portland cement in the mix.
- 2.06 ADMIXTURES
- A. No air-entraining admixtures or material containing air-entraining admixtures.
 - B. No antifreeze compounds shall be added to mortar.
 - C. No admixtures containing chlorides shall be added to mortar.
- 2.07 EQUIPMENT FOR MORTAR PREPARATION
- A. Equipment:
 - 1. Trough, plastic buckets, hoe, wooden mallet or ax handle, or similar implements
 - 2. Mortar pan mill
 - 3. Paddle or drum type mixers
 - 4. Undyed, unprinted burlap

PART 3 – EXECUTION

3.01 GENERAL

- A. Testing and Mortar Selection shall be reviewed by the Architect. The Contractor shall submit testing schedule, mortar schedule, and schedule of related repairs, including methods and materials to be used:
 - 1. Identify masonry units: Type and composition.
 - 2. Identify the crushing or compressive strength (psi) of masonry units.
 - 3. Identify properties, composition, and strength of historic mortar.
 - 4. Select mortars that match the existing in color, texture, quality, and materials.
 - 5. Select mortars that are softer than the existing mortar and the masonry units.
- B. Mortar components should be measured and mixed carefully (in a consistent manner) to assure uniformity of visual and physical characteristics.
- C. Pre-mixed mortar should be mixed and handled following manufacturer's specifications.

3.02 FIELD MORTAR MIXING LIME MORTARS

- A. Measure dry ingredients by volume.
- B. In a clean trough, wheelbarrow, or mixer (depending on quantities needed) combine and mix all dry ingredients thoroughly (before adding water).
- C. Add just enough clean water to "hold together," thus allowing the mixture to stand for a period prior to the addition of the remaining water.
- D. Prior to use, add half of the water and mix thoroughly for five (5) minutes.
- E. Add the remaining water in small portions until the desired consistency is reached. Keep the amount of water added to a minimum.
- F. Mortar should be used within approximately 30 minutes of final mixing. Do not retemper or add more water after final mixing.

3.03 FIELD MIXING FOR MORTAR USING LIME PUTTY

- A. Materials are measured by volume.
- B. Do not add additional water.
- C. Proportion sand first, and then add the lime putty.
- D. Mix in a clean trough for five (5) minutes or until all the sand is thoroughly coated with the lime putty by beating with a wood mallet or ax handle, interspersed by chopping with a hoe to achieve the maximum workability and performance.

OR

- E. Mix in a mortar pan mill when large quantities are needed, following the sequence above. Modern paddle and drum mixers do not achieve the desired results.
- F. Protect the mixture from the air by covering with wet burlap or seal in a large plastic bag.
- G. The sand/lime putty mix (which resembles brown sugar) can be stored indefinitely if placed in a sealed bag or container. Recombine mixture as specified in D above into a workable plastic state. *Do not add water.*

3.04 FIELD MIXING FOR PORTLAND CEMENT –LIME PUTTY-SAND MORTARS
(Type O or Type K)

- A. Materials are measured by volume.
- B. Combine sand and lime putty as described above and mix. Do not add water at this point.
- C. Mix the portland cement in to a slurry paste using clean water.
- D. Combine the portland cement slurry with the sand/lime putty mixture.
- E. Add color pigments, if any.
- F. Mix for five (5) minutes.
- D. Mixture should be used within 30 minutes to 1 ½ hours. Do not retemper mixture. Once portland cement is added, the mortar can no longer be stored.

3.05 FINAL REPORT

The Contractor shall:

- A. Document the work, testing, and mortar mixes used, and finished product, including photographs and final mortar schedules.
- B. Provide a written summary of the project and results upon final inspection and approval. The summary shall outline steps taken or new findings not specified in the initial documentation.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This specification has been developed for use on historic properties (defined as any district, site, building, structure, or object that is listed in or eligible for listing in the National Register of Historic Places) and provides an overview of accepted practices. Site-specific specifications, when appropriate, will be provided by the Architect.
- B. All work described herein and related work must conform to the Secretary of the Interior's Standards for the Treatment of Historic Properties.
- C. The Contractor shall provide all labor, materials, equipment, and operations required to complete the rehabilitation work indicated herein.
- D. All work described herein and related work must have the approval of a Cultural Resources Manager, Conservator, Historic Architect, or other professional who meets the standards outlined in the Secretary of the Interior's Standards – Professional Qualifications Standards pursuant to 36 CFR 61. Such person is referred to in this document as the *Architect*.

1.02 SECTION INCLUDES

- A. Selecting the appropriate stucco
- B. Preparation of lime-based stucco
- C. Preparation of portland cement-based stucco

1.03 RELATED SECTIONS

- A. 04110.02 – Repair and Replacement of Historic Stucco
- B. 04290 – Historic Adobe Masonry Units
- C. 04510.01 – Cleaning and Testing of Atmospheric Soiling, Graffiti, Stains, and Biogrowth
- D. 07100.01 – Water Repellent Properties and Application
- E. 09910.01 – Surface Preparation and Repainting of Paint on Masonry

1.04 REFERENCES

- A. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* available at the National Park Service (NPS) website at <http://www.nps.gov/history/hps/tps/standards_guidelines.htm>
- B. *Preservation Brief No. 22: The Preservation and Repair of Historic Stucco* available online at NPS website at <<http://www.nps.gov/history/hps/tps/briefs/brief22.htm>>.

- C. Conway, Brian D. *Illinois Preservation Series Number 2: Stucco*. Springfield, Illinois: Illinois Department of Conservation, Division of Historic Sites, 1980.
- D. Portland Cement Plaster (Stucco) Manual. Skokie, Illinois: Portland Cement Association, 1980.
- E. Vieux Carre Masonry Maintenance Guidelines. Revised from the initial report prepared by Mary L. Oehrlein in 1977. New Orleans, Louisiana: Vieux Carre Commission, 1980.
- F. ASTM C 207 Standard Specification for Hydrated Lime for Masonry Purposes.
- G. ASTM C 144 Standard Specification for Aggregate for Masonry Mortar.
- H. ASTM C 150 Standard Specification for Portland Cement.
- I. ASTM C 1328-05 Standard Specification for Plastic (Stucco) Cement.
- J. ASTM C 979 Specification for Pigments for Integrally Pigmented Concrete.

1.05 SUBMITTALS

- A. The Contractor shall submit a detailed schedule of the areas of stucco to be patched and new areas to be installed, including an assessment of the problem areas, a historic stucco analysis, and detailed procedures for preparation and stucco application, to the Architect for approval:
 - 1. Submit data indicating proportion or property specifications used for stucco.
 - 2. Submit test reports for mortar materials and report proportions resulting from laboratory testing used to select stucco mix.
- B. Product Literature. The Contractor shall submit manufacturer's product literature to Architect for all proprietary products specified for stucco preparation. Product literature shall include specification data, Material Safety Data Sheets, and instructions for storage, handling, and use.
- C. Historic stucco analysis. The Contractor shall submit the laboratory report from completed mortar analysis. Mortar analysis shall be completed prior to beginning test panel preparation. Analysis shall be limited to wet chemical and microscopic analysis to characterize the insoluble aggregate, determine binder-aggregate ratio, prepare a mix design for replacement mortar, and identify appropriate sources for sand aggregate.
- D. Samples. No stucco restoration work shall proceed until all samples are approved. The Contractor shall submit samples of the following stucco repair and replacement materials for approval of color and texture match:

Cured stucco samples: Prepare portable samples approximately 6x6 inches. Once a matching mortar color is achieved, placement of on-site mock-ups may begin.

1.06 QUALITY ASSURANCE

- A. Work Experience: The Contractor to perform the work in this section shall have a minimum of ten (10) years experience with historic stucco and mortars. He/she shall demonstrate a working knowledge of the Secretary of the Interior's Standards for Guidelines for Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings.
- B. Warranty: The Contractor shall provide a warranty in writing against defects in material and installation for a period of five (5) years.
- C. The Contractor shall not change sources or manufacturers of mortar materials during the course of the work.

1.07 MOCK-UPS

- A. After selection of a stucco color from the portable samples, the Contractor shall prepare two mock-up installations of each type of stucco to be installed at locations selected by the Architect. If cleaning tests are also to take place, test panels should in the same areas. Test panels should not be undertaken in areas that are highly visible. Each test panel shall be executed in the same manner as the final installation. Test panels shall have a minimum area of 3x3 feet. Test panels will be inspected for color, texture, and installation technique.
- B. The Contractor shall prepare up to three additional mock-ups of each mortar and mortar color without further compensation. Approved test area(s) shall become part of the work and shall serve as the quality standard for all subsequent work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall be deliver all products to the site in original packaging, unopened, and undamaged, with manufacture's name and product identification visible thereon, and manufacturer's instructions and Material Safety Data Sheets.
- B. The Contractor shall store all products in a dry location and protected from dampness and freezing following manufacturer's instructions.
- C. The Contractor shall stockpile and handle all aggregates in a manner that prevents contamination from foreign materials.

1.09 PROJECT / SITE CONDITIONS

- A. Normal conditions for the work of this Section shall be defined as when the air and surface temperatures are 40 degrees F and rising or less than 90 degrees F and falling. When temperatures are predicted to rise above or fall below this temperature range, the Contractor shall implement hot or cold weather procedures as defined by the Masonry Institute of America.
- B. Work shall not commence when rain, snow or below-freezing temperatures are expected within the next 24 hours. All surfaces shall be free of standing water, frost, and ice.

- C. The Contractor is responsible for protecting existing adjacent materials and surfaces, and substrate during the execution of the work and shall provide all necessary protection and follow all necessary work procedures to avoid damage to existing material assemblies not a part of the work in the Section.
- D. The Contractor shall provide visible barriers and / or warning tape around the perimeter of the work area for visitor protection and shall also provide that nearby vehicles and adjacent structures shall be protected from damage during the course of the work.
- E. The Contractor shall coordinate stucco work with the other trades involved in exterior and interior restoration work, including but not limited to masonry cleaning, sealing, and painting.

PART 2 - PRODUCTS

2.01 EVALUATION OF EXISTING STUCCO

- A. Microscopical and chemical analysis of historic stucco.
- B. Visual inspection, conditions assessment, and documentation.

2.02 LIME STUCCO

The type of substrate must be identified (see Section 04400.01, Identifying Masonry Types and Failures). The chosen stucco composition must be compatible in color, texture, finish, and quality with the existing stucco and substrate.

- A. Lime Based Stucco
 - 1. Lime should conform to ASTM C 207, Type S, Hydrated Lime for Masonry Purposes: 1,800 psi.
 - 2. Sand should match the existing stucco as closely as possible in color, texture, and gradation, should be free from impurities, and should conform to ASTM C 144.
 - 3. Water should be clean and potable.
 - 4. Hair or fiber (if used) should be goat or cattle hair, or pure manilla fiber of good quality, ½ to 2 inches in length, clean and free of dust, dirt, oil, grease, or other impurities.
 - 5. Colorants (if required for exact color match) should be non-fading, mineral oxide masonry pigment as manufactured by Solomon Grind-Chem Services, Riverton Lime Co., Medusa, or Architect-approved equal.
- B. Equipment: Trough, wheelbarrow, plastic buckets, hoe, hawk, trowel, burlap (clean, undyed, and unprinted)

2.03 PORTLAND AMENDED STUCCO

The type of substrate must be identified (see Section 04400.01, Identifying Masonry Types and Failures). The chosen stucco composition must be compatible in color, texture, finish, and quality with the existing stucco and substrate.

A. Portland amended stucco

1. Lime should conform to ASTM C 207, Type S, Hydrated Lime for Masonry Purposes: 1,800 psi.

OR

2. Gypsum: It is important to note that gypsum-based stucco is NOT compatible with lime based stucco. The two should NOT be used in conjunction with each other.
3. Sand should match the existing stucco as closely as possible in color, texture and gradation; be free from impurities; and conform to ASTM C 144
4. Cement should be gray and/or white, non-staining portland cement and conform to ASTM C 150, Type II. Gray and white cements may be combined as required to achieve the required color.
5. Water should be clean and potable.
6. Hair or fiber (if used) should be goat or cattle hair, or pure manila fiber of good quality, ½ to 2 inches in length, clean and free of dust, dirt, oil, grease, or other impurities.
7. Pigment (if used) should be compatible with the stucco mix and conform to ASTM C 979.

- B. Equipment: Trough, wheelbarrow, plastic buckets, hoe, hawk, trowel, burlap (clean, undyed, and unprinted).

2.04 LIME AND CEMENT STUCCO MIX

- A. General: Except as otherwise indicated, comply with the requirements of ASTM C 926-98a for the proportioning of materials and the manner of mixing the plaster for each required application; comply with manufacturer's instructions if more stringent than ASTM C 926.

B. Lime-Based Stucco

1. Scratch and brown coats:
1 part lime
3 parts sand
Binder
2. Finish coat:
1 part lime
3 parts sand

C. Lime-Portland Cement Stucco

1. Type N:

Scratch and brown coats:

1 part lime
1 parts Portland cement
6 parts sand
Binder

Finish coat:

1 part lime
1 parts Portland cement
6 parts sand

2. Type O:

Scratch and brown coats:

2 part lime
1 parts Portland cement
9 parts sand
Binder

Finish coat:

2 part lime
1 parts Portland cement
9 parts sand

2.05 PRE-MIXED STUCCO

With the Architect's approval, pre-mixed stucco may be used for patching and new stucco, provided it is compatible with the existing stucco and/or the masonry substrate. Provide manufacturer's full color range for selection or provide custom match. Follow manufacturer's recommended mixing and preparation procedures for factory-mixed products.

PART 3 - EXECUTION

3.01 GENERAL

- A. The extent of the stucco repair work and/or new areas to be stuccoed shall be reviewed by the Architect on site prior to beginning operations. The Contractor shall submit an annotated drawing or photographs showing the affected areas, along with a written description of the methods and materials to be used.
- B. The Contractor shall protect adjacent materials, openings, and substrate.

3.02 LIME BASED STUCCO

- A. Mix mortars in accordance with ASTM C 270.

- B. Measure dry ingredients by volume or equivalent weight. Do not measure by shovel. Combine in a clean, mechanical batch mixer.
- C. Mix dry ingredients thoroughly.
- D. Stucco materials shall be prehydrated to reduce shrinkage. Lime and sand shall be thoroughly mixed, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Stucco shall stand in this condition for 1 hour. Add portland cement and remainder of water and mix to provide a workable consistency. Stucco should be easily thrown from trowel and adhere to the surface for easy spreading.
- E. Do NOT over-mix (machine mix for 3-5 minutes).
- F. Stucco should be used in 1 ½ to 2 hours. Do not retemper or use partially hardened material.
- G. Wash all equipment promptly.

3.03 FINAL REPORT

The Contractor shall provide a final report of complete work including all approved submittals and photographs of the repaired areas taken before, during, and after the work.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This specification has been developed for use on historic properties (defined as any district, site, building, structure, or object that is listed in or eligible for listing in the National Register of Historic Places) and provides an overview of accepted practices. Site-specific specifications, when appropriate, will be provided by the Architect.
- B. All work described herein and related work must conform to the Secretary of the Interior's Standards for the Treatment of Historic Properties.
- C. The Contractor shall provide all labor, materials, equipment, and operations required to complete the rehabilitation work indicated herein.
- D. All work described herein and related work must have the approval of a Cultural Resources Manager, Conservator, Historic Architect, or other professional who meets the standards outlined in the Secretary of the Interior's Standards – Professional Qualifications Standards pursuant to 36 CFR 61. Such person is referred to in this document as the *Architect*.

1.01 SECTION INCLUDES

- A. Selecting the appropriate stucco (see Section 04110.01)
- B. Stucco patching
- C. Stucco replacement
- D. Reattachment by injection grouting

1.02 RELATED SECTIONS

- A. 04110.01 – Preparation of Lime- or Portland-Based Stucco
- B. 04400.01 – Identifying Masonry Types and Failures
- C. 04510.01 – Cleaning and Testing of Atmospheric Soiling, Graffiti, Stains, and Biogrowth
- D. 07100.01 – Water Repellent Properties and Application
- E. 09910.01 – Surface Preparation and Repainting of Paint on Masonry

1.03 REFERENCES

- A. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* available at the National Park Service (NPS) website at http://www.nps.gov/history/hps/tps/standards_guidelines.htm.

- B. *Preservation Brief No. 22: The Preservation and Repair of Historic Stucco* available online at NPS website at <<http://www.nps.gov/history/hps/tps/briefs/brief22.htm>>.
- C. Conway, Brian D. *Illinois Preservation Series Number 2: Stucco*. Springfield, Illinois: Illinois Department of Conservation, Division of Historic Sites, 1980.
- D. Portland Cement Plaster (Stucco) Manual. Skokie, Illinois: Portland Cement Association, 1980.
- E. Vieux Carre Masonry Maintenance Guidelines. Revised from the initial report prepared by Mary L. Oehrlein in 1977. New Orleans, Louisiana: Vieux Carre Commission, 1980.
- F. ASTM C 207 Standard Specification for Hydrated Lime for Masonry Purposes.
- G. ASTM C 144 Standard Specification for Aggregate for Masonry Mortar.
- H. ASTM C 150 Standard Specification for Portland Cement.
- I. ASTM C 1328-05 Standard Specification for Plastic (Stucco) Cement.
- J. ASTM C 979 Specification for Pigments for Integrally Pigmented Concrete.

1.04 SUBMITTALS

- A. The Contractor shall submit a detailed schedule of the areas to be stuccoed, including an assessment of the problem areas, a historic stucco analysis, and detailed procedures for stucco repairs, to the Architect for approval.
- B. Product Literature: The Contractor shall submit manufacturer's product literature to the Architect for all proprietary products specified for stucco patching, grouting and replacement. Product literature shall include specification data, Material Safety Data Sheets, and instructions for storage, handling, and use.
- C. Samples: No stucco restoration work shall proceed until all samples are approved. The Contractor shall submit samples of the following stucco repair and replacement materials for approval of color and texture match:

Cured stucco samples: Prepare portable samples approximately 6x6 inches. Once a matching mortar color is achieved, placement of on-site mock-ups may begin.

1.05 QUALITY ASSURANCE

- A. Work Experience: The Contractor to perform the work in this section shall have a minimum of ten (10) years experience with historic stucco and plaster. He/she shall demonstrate a working knowledge of the Secretary of the Interior's Standards for Guidelines for Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings.
- B. The Contractor shall not change sources or manufacturers of stucco materials during the course of the work.

- C. Warranty: Installer shall provide a warranty in writing against defects in material and installation for a period of five (5) years.

1.06 MOCK-UPS

- A. The Contractor shall prepare mock-up installations of each type of stucco to be installed at locations selected by the Architect. Test panels shall have a minimum area of 3x3 feet and shall include all types of work required in the overall project, such as patching, injection grouting, and crack repair. Any special tooling and texturing should be included. If cleaning tests are also to take place, test panels should be prepared on the same area. Test panels should not be undertaken in areas that are highly visible. Test panels will be inspected for color, texture, and installation technique.
- B. After the test panels have cured for a period of two to three weeks (or otherwise specified by the Architect), the test panels will be inspected for color, texture, and installation technique.
- C. Each mechanic proposed for work on the project shall prepare a mock-up panel. Mechanics whose mock-ups are not approved shall not be permitted to work on stucco repair and replacement.
- D. Where stucco color is not acceptable, the Contractor shall prepare up to three additional mock-ups of each mortar and mortar color without further compensation. Approved test area(s) shall become part of the work and shall serve as the quality standard for all subsequent work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall deliver all products to the site in original packaging, unopened, and undamaged with manufacturer's name and product identification visible thereon, and manufacturer's instructions and Material Safety Data Sheets.
- B. The Contractor shall store products in a dry location and protected from dampness and freezing following manufactures instructions.
- C. The Contractor shall stockpile and handle aggregates in a manner to prevent contamination from foreign materials.

1.08 PROJECT / SITE CONDITIONS

- A. Normal conditions for the work of this Section shall be defined as when the air and surface temperatures are 40 degrees F and rising or less than 90 degrees F and falling. When temperatures are predicted to rise above or fall below this temperature range, the Contractor shall implement hot or cold weather procedures as defined by the Masonry Institute of America.
- B. The Contractor is responsible for protecting existing adjacent materials and surfaces during the execution of the work and shall provide all necessary protection and follow all necessary work procedures to avoid damage to existing material assemblies not a part of the work in the Section:

1. Minimize levels of dust during stucco removal and application operations.
 2. Protect open joints and other vulnerable areas from water penetration to prevent leakage during the course of the work. Open areas shall not be left exposed overnight or when inclement weather is predicted.
 3. Temporarily remove and store metal downspouts, window grilles, and other surface-mounted appurtenances during stucco restoration work. Install temporary drainage leaders and window protection if required. Reinstall immediately upon completion of work in the immediate area. Protect open boots at grade from accumulation of stucco debris.
 4. Protect existing built-in gutters and gutter outlets from damage and accumulation of mortar debris during work on chimneys and parapets.
 5. Protect window sashes and frames with plywood or other sturdy barrier during removal of stucco around window openings.
 6. Protect the existing roof surface from damage during the course of the stucco restoration work. Repair all damage to slates, metal roofing, gutters, flashings, etc., to the satisfaction of, and at no additional cost to, the Owner.
 7. Protect adjacent work from moisture deterioration and soiling due to stucco application operations. Provide temporary coverings as required to minimize spattering of plaster on other materials.
- C. The Contractor shall provide visible barriers and / or warning tape around the perimeter of the work area for visitor protection and shall provide that nearby vehicles and adjacent structures are protected from damage during the course of the work.
- D. Contractor shall coordinate stucco work with the other trades involved in exterior and interior restoration work, including but not limited to masonry cleaning, sealing, and painting.

PART 2 – PRODUCTS

2.01 PATCHING HISTORIC STUCCO

The type of substrate must be identified (see section on Identifying Masonry Types and Failures 04400.01). The chosen stucco composition must be compatible with the substrate.

A. Patching Material:

1. Stucco: See Section 04110.01, Preparation of Lime or Portland-Based Stucco.
2. Bonding agent

B. Equipment:

1. Mixing: Trough, wheelbarrow, plastic buckets, hoe, hawk, trowel, burlap (clean, undyed, and unprinted)

2. Stucco Application: Plastic buckets, hoe, hawk, trowel, burlap (clean, undyed, and unprinted)
3. Stucco Removal: Chisel, mason's or chipping hammer, mallet, mortar board
4. Injection Grouting: Syringes (multiple sizes), plywood, miscellaneous lumber, foam-rubber padding

2.02 METAL SUPPORT, FURRING, LATHING, AND ACCESSORY MATERIALS FOR STUCCO

A. Metals and Finishes:

1. Exterior Components: Hot-dip galvanized finish; ASTM A653-99 for 18-gauge and lighter formed metal products; ASTM A 123-97 galvanized after fabrication for 16-gauge and heavier products.
2. Exterior Exposed Plastering Accessories: Provide zinc alloy accessories.

B. Wire Ties: Galvanized soft steel wire, gauge as required.

C. Metal Lathing Materials:

1. Product Standards: Comply with FS QQ-L-101.
2. Exterior Metal Lath: Self-furring, 3.4 lbs. per square yard, galvanized steel with black asphaltum coating.

D. Metal Plastering Accessories:

1. Square Edge Casting Beads: Manufacturer's standard, size for thickness indicated, with expanded or short flange to suit application.
2. Fasteners: Galvanized steel, of type and length suitable for adequate penetration of the substrate.

2.03 INJECTION GROUTING

A. Cementitious injection grout shall be an industry-approved, factory-mixed product. Selected products must be approved by the Architect.

B. Injection ports and surface cracks shall be sealed with removable, non-staining clay during injection grouting.

PART 3 - EXECUTION

3.01 GENERAL

- ### A. The extent of the stucco work and areas to be stuccoed shall be reviewed by the Architect on site prior to beginning operations. Contractor shall submit testing schedule and a stucco schedule, including the methods and materials to be used.

B. The Contractor shall protect adjacent materials, openings, and substrate.

3.02 EVALUATION OF EXISTING STUCCO

A. Visual inspection and conditions analysis: The Contractor shall:

1. Identify cause and location of stucco deterioration.
2. Coordinate stucco work with other repairs such as gutter and roof work, cleaning, removal of overgrown vegetation, water runoff and diversion from the building, painting and sealing.

3.03 STUCCO REPAIR OF MINOR CRACKS ($\frac{1}{8}$ inch and smaller)

- A. Crack should be free from dirt, grease, and vegetation. Blow cracks clean with compressed air.
- B. Coat crack with a bonding agent in accordance with manufacturer's instructions.
- C. Prepare a slurry coat of stucco to match the color and finish of the existing stucco.
- D. Apply a light coat of the slurry along the crack and work to match existing stucco.

3.04 STUCCO REPAIR OF LARGE CRACKS (larger than $\frac{1}{8}$ inch)

- A. Cracks to be repaired shall be routed to a minimum width and depth of $\frac{1}{4}$ inch to accommodate mortar fill. The edges of the crack shall be undercut where possible. Brush cracks clean of loose debris with a soft brush.
- B. The area to receive the mortar fill shall be thoroughly wetted to prevent dehydration of the mortar. Re-wet as necessary. Using the approved stucco mix, fill the crack proud and work mortar in as tightly as possible until flush with adjoining surface. Remove excess mortar. Protect filled areas with plastic and re-wet periodically to allow a full cure.

3.05 STUCCO REPAIR BY PATCHING

- A. Extent and area of patches shall be carefully assessed and reviewed by the Architect.
- B. Remove all loose, deteriorated, and severely cracked stucco to the masonry substrate or lath. Avoid oversounding to prevent additional damage to adjacent keys.
- C. Stucco on Masonry Substrate:
 1. Stucco is applied directly to masonry substrates such as brick, stone, concrete, or hollow tile without lath.
 2. If necessary, rake out brick or stone mortar joints to a depth of $\frac{5}{8}$ inch.
- D. Masonry on Wood Substrate:
 1. Wood Substrate: Determine type of lath—horizontal wood slats or wire mesh.

2. Lath should be in good condition, free of rot and / or rust.
 3. Replace areas of metal lath and underlay as approved by the Architect. New wire lath should be nailed over existing wood lath, following review by the Architect.
- E. Surface should be free of debris, dust, dirt, grease, oil, paint, and vegetation. Clean with a bristle brush.
- F. Area should be cut on the diagonal and squared off with a butt joint to provide a neat patch. If necessary, and as reviewed by the Architect, it may be preferred to stucco the area of an entire feature.
- G. New patch must not overlap existing stucco.
- H. Dampen surface before applying stucco.
- I. Apply the scratch coat to the masonry substrate or lath. Number and thickness of the repair coats should match the historic stucco. The scratch coat is generally $\frac{1}{4}$ to $\frac{3}{8}$ inch thick, and must be scratched or crosshatched with a comb to provide a key for the second coat. Allow scratch coat to dry 24 to 72 hours.
- J. The leveling or second coat is often applied in the same thickness as the initial coat. The total thickness of the first two coats is generally $\frac{5}{8}$ inch. Roughen with a wood float with a nail protruding to provide a key for the finish coat.
- K. The final or finish coat is applied when the leveling coat is initially set. Work the finish coat to match the texture of the historic stucco.

3.06 INJECTION GROUTING

A. Surface preparation:

1. Remove any surface vegetation to fully expose the delaminated area to be repaired following recommended cleaning treatments (see Section 04510). Vines should be cut at the roots and allowed to wither and dry completely before removal from the wall. After the dry plant has been carefully pulled away, wash the wall with water and a soft bristle brush. In extreme cases where the tendrils are deeply imbedded, extensive damage may have occurred, and the section involved may require replacement of the stucco. In extreme cases, consult with the Architect prior to removal of the stucco.
2. Remove surface dirt by scrubbing with clean water and a soft bristle brush. No acidic or alkaline cleaning agents shall be employed.
3. The crack shall be blown clean with compressed air (40 to 60 psi) prior to grouting.

B. Injection Grouting:

1. Seal any cracks in the delaminated area to be grouted using the approved removable clay or sealant, leaving injection ports at regular intervals per the manufacturer's instructions. Test the seal and dampen the cavity using an initial injection of plain water; re-seal as necessary.

2. Begin grouting at the lowest injection port, continuing until grout is visible at the next injection port. Plug the injection port and proceed to the next one. Discontinue grouting if leakage appears, and do not resume until seal is repaired. Continue grouting from bottom to approximately half the height of the delaminated area. Using a padded piece of plywood, push the delaminated layer gently toward the substrate until grout appears at the topmost injection port. Support in place for a minimum of 72 hours until grout is fully cured.
3. Patch injection ports with approved stucco mixture.

3.07 PREPARATIONS FOR STUCCO REPLACEMENT

- A. Remove existing stucco, lath, and accessories down to masonry substrate to allow for masonry and/or flashing repairs as required. Coordinate with other trades to ensure that repairs are completed before installing new stucco.
- B. Apply self-furring metal lath on existing masonry surfaces indicated for stucco application; nail to substrate 1 foot o.c., both directions. New and rebuilt brick surfaces may be left with the joints raked to receive stucco.
- C. Install temporary grounds and screeds as necessary to ensure accurate rodding of stucco to true surfaces; coordinate with scratch-coat work.
- D. Plastering Accessories: Anchor to substrates by nailing 8 inches o.c. along each flange. Miter corners and spline joints of exposed accessories, to form tight joints without offsets. Install metal casing beads where shown at the following locations:

Where plaster abuts other finishes and termination is not lapped by other finish. Leave $\frac{3}{8}$ -inch wide pocket for sealant unless otherwise indicated.
- E. Masonry surfaces to receive direct stucco application are to be thoroughly wetted prior to stucco application. Do not dampen metal lath where used.

3.08 INSTALLATION OF REPLACEMENT STUCCO

- A. General:
 1. Standards: Except as otherwise indicated, comply with ASTM C 926 for stucco work.
 2. Do not use materials that are frozen, caked, or lumpy, or that are contaminated by foreign materials. Use only clean water, free from impurities that may impair the plaster work; do not use water that has been used to clean tools.
 3. Do not use excessive water in the mixing and application of plaster materials.
 4. Sequence plastering applications with other work in accordance with recognized industry practices.
 5. Prepare all stucco in a mechanical mixer.

B. Plaster Applications:

1. Apply 3-coat stucco over metal lathed and masonry substrates (scratch/level, brown and finish coats). New stucco thickness to be $\frac{7}{8}$ inch thick in compliance with ASTM C 926-98a. Stucco patches are to match the level of the surrounding surface.
2. Allowable Tolerances: For flat surfaces, do not exceed $\frac{1}{4}$ inch in 8 feet for bow or warp surface, and for plumb and level.
3. Finish Coat Texture/Pattern: Patches to existing stucco shall match the existing surface texture:
 - a. Where scoring is required, utilize a straight-edge and a square-tipped tool of the same width as the existing joint scoring.
 - b. New scoring shall match the block sizes and bond of the existing pattern.
4. Curing: Protect each coat of stucco work from drying out for a period of 24 hours after placement (or until curing operation will not damage surface), and moisture cure not less than 48 hours after time of placement.

3.09 FINAL REPORT

- A. For stucco repair and replacement where no paint or other surface finish is applied, the contractor shall revisit the site with the Architect after the new stucco has cured at least 30 days to inspect the work to see if the desired effect has been achieved.
- B. The Contractor shall provide a final report of complete work including all approved submittals and photographs of the repaired areas taken before, during, and after the work.

END OF SECTION

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This specification has been developed for use on historic properties (defined as any district, site, building, structure, or object that is listed in or eligible for listing in the National Register of Historic Places) and provides an overview of accepted practices. Site-specific specifications, when appropriate, will be provided by the Architect.
- B. All work described herein and related work must conform to the Secretary of the Interior's Standards for the Treatment of Historic Properties.
- C. The Contractor shall provide all labor, materials, equipment, and operations required to complete the rehabilitation work indicated herein.
- D. All work described herein and related work must have the approval of a Cultural Resources Manager, Conservator, Historic Architect, or other professional who meets the standards outlined in the Secretary of the Interior's Standards – Professional Qualifications Standards pursuant to 36 CFR 61. Such person is referred to in this document as the *Architect*.

1.02 SECTION INCLUDES

- A. Stone identification
- B. Identification of deterioration patterns and failure modes

1.03 RELATED SECTIONS

- A. Section 04100 – Historic Mortar
- B. Section 04500 – Masonry Restoration
- C. Section 04510 – Masonry Cleaning
- D. Section 04720 – Historic Cast Stone

1.04 DEFINITIONS

- A. Igneous Rock. Rock formed under conditions of intense heat or produced by the solidification of volcanic magma on or below the Earth's surface.
- B. Metamorphic Rock. Preexisting igneous rock and sedimentary rock, and other metamorphic rock, that has undergone a transformation in physical form, appearance, or character, to form a new stone with properties distinct from the original stone. Metamorphic rock is formed through pressure, heat, or both within the Earth's crust.
- C. Sedimentary Rock. Rock that is formed from material, including debris of organic origin, deposited as sediment by water, wind, or ice, and then consolidated by pressure.

1.05 REFERENCES

- A. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* available at the National Park Service (NPS) website at http://www.nps.gov/history/hps/tps/standards_guidelines.htm.
- B. See General Services Administration, *Historic Preservation Technical Procedures Standards for Marble, Limestone, Granite and Sandstone*.
- C. *Conservation of Historic Stone Buildings and Monuments*. Report of the Committee on Conservation of Historic Stone Buildings and Monuments. Washington: National Academy Press, 1982.
- D. Weaver, Martin E. *Conserving Buildings: A Manual of Techniques and Materials*. Revised edition. New York: John Wiley & Sons and the Preservation Press, 1997.
- E. Wheeler, George S., et al. *Stone Masonry. Historic Building Facades: The Manual for Maintenance and Rehabilitation*. William Foulks, editor. Prepared for the New York Landmarks Conservancy. New York: John Wiley & Sons and the Preservation Press, 1997.
- F. ASTM Standards as follows:
 - 1. C97 Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone
 - 2. C99 Test Method for Modulus of Rupture of Dimension Stone
 - 3. C119 Terminology Relating to Dimension Stone
 - 4. C120 Test Methods for Flexure Testing of Slate (Modulus of Rupture, Modulus of Elasticity)
 - 5. C121 Test Method for Water Absorption of Slate
 - 6. C170 Test Method for Compressive Strength of Dimension Stone
 - 7. C217 Test Method for Weather Resistance of Slate
 - 8. C241 Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic
 - 9. C503 Specification for Marble Dimension Stone
 - 10. C568 Specification for Limestone Dimension Stone
 - 11. C615 Specification for Granite Dimension Stone
 - 12. C616 Specification for Quartz-Based Dimension Stone
 - 13. C629 Specification for Slate Dimension Stone
 - 14. C880 Test Method for Flexural Strength of Dimension Stone

15. C1201 Test Method for Structural Performance of Exterior Dimension Stone Cladding Systems by Uniform Static Air Pressure Difference
 16. C1242 Guide for Design, Selection, and Installation of Exterior Dimension Stone Anchors and Anchoring Systems
 17. C1352 Test Method for Flexural Modulus of Elasticity of Dimension Stone
 18. C1353 Test Method for Using the Taber Abraser for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic
- G. *The American Standard Specifications for Interior Marble and Dimensional Stone—Design Manual IV* as published by the Marble Institute of America.
- H. *Recommended Practices* as published by The Building Stone Institute, Elgin, Illinois.
- I. *ILI Handbook – 21st edition* as published by the Indiana Limestone Institute of America.

1.06 SUBMITTALS

- A. Samples: Stone and mortar samples shall be submitted as requested by the Architect. The Contractor shall furnish not less than five stone samples, showing variations in color, texture, and finish.
- B. Product Literature: The Contractor shall submit stone supplier's literature regarding the source of the selected building stone, and any available testing information regarding the material's physical properties, such as compressive strength, absorption, and resistance to abrasion, demonstrating conformance to the referenced standards.

1.07 QUALITY ASSURANCE

- A. Work Experience: The selected Contractor shall have a minimum of 10 years experience in masonry conservation with emphasis on Architectural Stone. The Contractor shall demonstrate a working knowledge of *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings*, including experience in historic masonry conservation.
- B. The Contractor shall not change sources or manufacturers of mortar or stone materials during the course of the work unless approved by the Architect.
- C. Warranty: The Contractor shall provide a warranty in writing against defects in material and installation for a period of five (5) years.

1.08 DELIVERY, STORAGE, AND HANDLING (as applied to products and materials)

The Contractor shall:

- A. Transport and handle stone units in such a manner as to prevent chipping and breakage; locate storage piles, stacks, or bins to avoid and protect material from heavy and unnecessary traffic; and store stone slabs on pallets on edge.

- B. Coordinate stone deliveries with the construction schedule and sequence. Stone materials shall be delivered in an order consistent with the order of installation at the project site to avoid unnecessary handling of materials.
- C. Protect stones from the ground and weather and keep them free from exposure to contaminants such as mud, dust, or materials that could cause staining.
- D. Deliver materials to the site in original packaging, unopened, with manufacturer's name and product identification thereon. Cementitious materials shall be protected from contamination by foreign matter and deterioration by moisture or temperature. Contaminated or deteriorated material shall not be used. Products stored longer than six months shall not be used.
- E. Store masonry materials in such a manner as not to interfere with the operation and daily maintenance of the facility. Proposed storage locations shall be approved by the Owner prior to the delivery of materials. Masonry materials shall not be stored inside the building.

1.09 PROJECT / SITE CONDITIONS

- A. Stone repairs shall be executed only when the air and surface temperatures are 40 degrees F and rising or less than 90 degrees F and falling. Minimum temperature for masonry work shall be 50 degrees F and above for at least 2 hours after completion and above freezing for at least 24 hours after completion. Work shall not commence when rain, snow, or below-freezing temperatures are expected within the next 24 hours. All surfaces shall be free of standing water, frost, and ice.
- B. The Contractor shall cover the top of the wall with strong waterproof membrane at the end of each day or shutdown. The Contractor shall cover partially completed walls when work is not in progress. Covering shall extend a minimum of 24 inches on each side of openings and be fastened securely.
- C. The Contractor is responsible for protecting existing adjacent materials and surfaces during the execution of the work and shall provide all necessary protection and follow all necessary work procedures to avoid damage to existing material assemblies not a part of the work in this Section.
- D. The Contractor shall provide visible barriers and / or warning tape around the perimeter of the work area for visitor protection. Nearby vehicles and adjacent structures shall be protected from damage during the course of the work.
- E. The Contractor shall coordinate stone repairs with the other trades involved in exterior and interior restoration work, including but not limited to masonry cleaning, sealing, and painting.

PART 2 – PRODUCTS

2.01 STONE TYPES AND DEFINITIONS

- A. Gneiss. A metamorphic rock with a banded or coarsely foliated structure, often commercially referred to as granite. Composed essentially of silicate minerals with interlocking and visibly granular texture in which the foliation is primarily the result of alternating layers, regular or irregular, of contrasting mineralogic composition.

- B. Granite. Commercial granite includes almost all rocks of igneous origin. True granites are a very hard, crystalline, igneous rock, gray to pink in color, composed of alkali feldspar, quartz, and lesser amounts of dark ferromagnesium materials and can include minerals such as micas and hornblende. Geologically, granite is distinguished from other rocks that it resembles on the basis of the percentages of quartz, potassium feldspar, and plagioclase feldspar. Commercially, this distinction is not utilized. Black fine-grained igneous rocks, such as basalt or traprock (diabase), are called “black granite.” Although similar to true granites in structure and texture, “black granites” and other dark “granites” are composed of different minerals.
- C. Greenstone. Greenstone is defined by ASTM as a metamorphic rock principally containing chlorite, epidote, or actinolite.
- D. Limestone. ASTM defines limestone as a sedimentary rock composed primarily of calcite (calcium carbonate) or dolomite (calcium magnesium carbonate). The texture of limestone varies greatly, from uniform grain size and color to “cemented-shell mash.” Some limestones have varying amounts of other material, such as quartz sand or clay mixed in with the carbonate minerals. Most limestones are formed of shells or shell fragments, although many commercial limestones, including oolitic and very fine-grained and compact varieties are chemical precipitates. The varieties of limestone used as dimensional stone are usually well consolidated and exhibit a minimum of graining or bedding direction. Recrystallized limestones and compact, dense, relatively pure microcrystalline varieties (or partially metamorphosed limestone) that are capable of taking a polish are commercially known as marbles.
1. Calcarenite: Calcarenite is composed of sand-sized grains of calcite, usually in the form of tiny fossils, shell aggregates and fossil debris. Some calcarenites contain oolites. When oolites are present in sufficient quantity, the stone is called oolitic limestone. Oolitic limestone is a subcategory of calcarenite.
 2. Coquina: Coquina consists of raw, unaltered shell fragments, often quite large, loosely cemented by calcite. It is generally very coarse and porous, frequently consisting of oyster shells and fragments.
 3. Dolomite: Dolomite is a sedimentary carbonate rock composed of calcium and magnesium carbonate. Limestones that contain not more than 5 percent magnesium carbonate may be termed calcite limestone; those that contain from 5 percent to 40 percent magnesium carbonate are called magnesium limestone; and those that contain in excess of 40 percent as dolomite.
 4. Microcrystalline Limestone: A limestone structure of crystals too small to be seen without magnification.
 5. Oolitic Limestone: A calcite cemented calcareous stone composed of shell fragments, practically non-crystalline in character. Generally without cleavage, and extremely uniform in composition and texture, oolitic limestone adjusts to temperature changes. Oolitic limestone, a popular building stone in the U.S., Britain, and France, consists of cemented round grains of calcite or aragonite generally under 2 millimeters in diameter.
 6. Travertine: Travertine is a variety of limestone deposited from solution in groundwaters and surface waters. Hard and compact varieties, such as that from Rome, are

quarried for building stone. Generally it is characterized by a variegated gray and white or buff color with irregularly shaped pores distributed throughout the ground-mass.

- E. Marble. According to ASTM, commercial marble includes all crystalline rocks composed predominantly of calcite, dolomite, or serpentine and capable of taking a high polish. Geologically, marble is a metamorphic (recrystallized) limestone composed predominately of crystalline grains of calcite or dolomite or both, having interlocking or mosaic texture. As a result, commercial marble includes many crystalline limestones, travertine, and serpentine, a metamorphosed ultramafic rock. The color and pattern associated with marble are due to striations of accessory minerals, such as talc, chlorite, amphiboles, and pyroxenes, as well as iron oxides, hydroxides, sulfides, and graphite.
- F. Quartzite. Quartzite is a metamorphosed sandstone consisting almost entirely of quartz. It is a locally used stone found in South Dakota and Wisconsin.
- G. Sandstone. ASTM defines sandstone as a “consolidated sand in which the grains are composed chiefly of quartz and feldspar, of fragmental texture, and with various interstitial cementing materials, including silica, iron oxides, calcite, or clay.” This sedimentary rock is durable, has a very high crushing and tensile strength and a wide range of colors or textures. Commercially used sandstone is a clastic sediment consisting almost entirely of quartz grains, 1/16 to 2 millimeters in diameter, with various types of cementing material. Enough voids generally remain in the rock to give it considerable permeability and porosity.
 - 1. Brownstone: Deep brown, red, purple, and pink sandstones are commonly called brownstone. Brownstone is an arkosic sandstone that is rich in feldspar grains and was quarried in the Triassic basins of the eastern states. Popular from the 1840s through the early twentieth century, brownstone was used on urban row houses, commercial buildings, and churches.
- H. Schist. A foliated metamorphic rock (recrystallized) characterized by thin foliae that are composed predominantly of minerals of thin platy or prismatic habits and whose long dimensions are oriented in approximately parallel positions along the planes of foliation. Because of this foliated structure, schists split readily along these planes and so possess a pronounced rock cleavage. The more common schists are composed of the micas and other mica-like minerals (such as chlorite) and generally contain subordinate quartz and/or feldspar or comparatively fine-grained texture; all graduations exist between schist and gneiss (coarse is foliated feldspathic rocks).
- I. Shale. Shale is a dark fine-grained sedimentary rock composed of layers of compressed clay, silt, or mud that has been subjected to high pressure until it has hardened rock-like.
- J. Slate. ASTM requires a slate to possess an excellent parallel cleavage that allows the rock to be split with relative ease into thin slabs. Slate is a fine-grained metamorphic rock derived from argillaceous sediments (clay and shales) consisting of extremely fine-grained quartz, mica and other platy minerals. The color of slate is generally determined by the oxidation state of the iron or the presence of graphite or pyrite.
- K. Traprock. is a microcrystalline volcanic or dike rock that consists primarily of pyroxene and a calcic plagioclase, known for its stark black color. Commercially, traprock includes basalt, gabbro, diorite, and andesite.

2.02 CHARACTERISTICS

- A. Granite: Granite is one of the most durable stones used for artistic and architectural applications. Compared to calcareous sandstones, marble and limestone, granite is not an acid soluble stone and is much more resistant to the effects of acidic solutions, rainwater ,or cleansing agents. In general, igneous building stones, such as granite, have a more inert composition; show much lower rates of deterioration; have lower water absorption, and are harder than marbles, limestones, and sandstones.
- B. Limestone: Limestone is a soft rock and is easily scratched. It will effervesce readily in any common acid. Limestone may vary greatly in texture and porosity from coquina, which is a matrix of oyster shells loosely cemented by calcite, to oolitic limestones and microcrystalline limestone whose structures are so fine that they can be seen only under magnifications. Limestone coloration is generally a consistent pure white or off-white. Many varieties do not take a polish well, so that the surface is typically a matte finish, no-gloss surface. Limestone that does take a polish is sometimes commercially called marble. Limestones, like marble and other calcareous stones, are referred to as acid sensitive. Calcareous stones are readily dissolved in acid, therefore acidic products should not be used on limestones and marbles.
- C. Marble: Fully metamorphosed marble (not to be confused with trade marbles that are actually limestones) is an extremely hard stone composed of calcite. The stone has a very tight crystalline structure and small but definite porosity. Marble can take a very high polish. The limited porosity of marble, especially polished marble, makes it less vulnerable to the leaching effects of water. Calcium carbonate, however, of which marble is composed is highly susceptible to attack by acidic agents. Marble is readily dissolved by acids, even very dilute acids, however the actual results of acidic exposure will vary with the nature of the acid. Chlorides, nitrates, sulfates, and other chemical compounds react differently with marble and produce various by-products, which have a wide range of solubility and impact on the durability of marble. For this reason, it is always important to determine the exact type of pollutants causing marble deterioration. Marble can be of two types, one composed of calcite and the other of dolomite. Dolomitic marble is much more resistant to acid attack than calcitic marble. The color of marble ranges from brilliant white of calcite to black, including blue-gray, red, yellow, and green, depending upon the mineral composition.
- D. Sandstone: Sandstone is very porous and is easily penetrated by water. The stone weathers best when its end-grain faces the weather (naturally bedded). Face-bedded stone is subject to greater deterioration. Water damages a face-bedded stone by spalling or flaking off entire sheets. The stone is also highly subject to deterioration through freeze-thaw cycles, which can cause layers to split off. During the nineteenth century, the grain was often placed parallel to the weather side (face-bedded) for aesthetic reasons, especially around doorways. Sandstone can contain a variety of minerals, which determine the stone's color. The mineral makeup can also make the stone susceptible to some chemicals.

2.03 CONSTRUCTION TERMINOLOGY/METHODS

- A. Ashlar/Ashlar Masonry: Ashlar masonry refers to stone that has a flat-faced surface that is generally square or rectangular, and has sawed or dressed beds and joints. The rectangular blocks include a finished or rock-faced surface, contrasted with cut blocks that are accurately sized and surface tooled. Ashlar masonry is comprised of rectangular blocks of stone or equivalent, generally larger in size than a brick.

- B. Course: A layer of masonry units, bonded with mortar, that runs horizontally in a wall or much less commonly, that is curved over an arch.
- C. Coursed Ashlar/Coursed Masonry: Stone masonry in which the stones within each course are identical in height, although the courses themselves need not be the same height.
- D. Dimension Stone: Natural stone quarried for the purpose of obtaining blocks or slabs that meet specifications as to size (width, length, and thickness) and shape, color, grain texture and pattern, and surface finish. Durability (essentially based on mineral composition and hardness and past performance), strength, and the ability of the stone to take a polish are other important selection criteria. Although a variety of igneous, metamorphic, and sedimentary rocks are used as dimension stone, the principal rock types are granite, limestone, marble, sandstone, and slate.
- E. Dressed/Hand Dressed: The cutting of rough chunks of stone by hand to create a square or rectangular shape. A stone that is sold as dressed stone generally refers to stone ready for installation.
- F. Dry-Laid Stone/Drystone Masonry: Stonework constructed stone-upon-stone, without mortar, using unquarried native stone collected locally; also referred to as dry wall. The stones are tightly fitted and stacked with precision to form a strong wall. This method was utilized in wall construction for walls and foundations of buildings and structures through the first quarter of the nineteenth century.
- G. Dutchman: A small, matching piece of stone that is cut, finished, and attached with the tightest possible joint to repair or replace a missing or damaged area.
- H. Rubble/Rubble Masonry: Masonry construction in which stones of random size (sometimes roughly dressed) are used.
- I. Rusticated Stone: Any stone masonry having strongly emphasized recessed joints; the exposed face of the masonry may be smooth or roughly textured. The border of each masonry block may be beveled on all four sides, only at the top and bottom, or on adjacent sides.
- J. Veneer Stone: Any stone used as a decorative facing material that is not meant to be load bearing. A non-load-bearing stone wall that is securely anchored to the back-up wall.
- K. Wythe: A masonry wall, one stone or brick thick, that either faces a back-up or is a back-up wall and secured to its neighboring wythes by bond stone or grout; or forms either half of a cavity wall, and is attached to the other half by metal ties.

2.04 MORTAR FOR HISTORIC MASONRY (see Sections 04100.02 and 04500.02)

PART 3 – EXECUTION

3.01 GENERAL

- A. Stone masonry shall use techniques, methods and materials as similar as possible to those of the original. Work should be sequenced not only to assure the stability of the structure and protection of personnel during the work, but also to address a sensible order of construction to integrate new work with existing work.

- B. The Contractor shall coordinate stone work with the other trades involved in exterior and interior restoration work including, but not limited to, masonry cleaning, sealants, and painting.
- C. Masonry cleaning shall be completed prior to beginning repair or replacement work.

3.02 CONDITIONS ASSESSMENT

The Contractor shall:

- A. Identify each type of stone.
- B. Examine the overall surface condition and appearance.
 - 1. Note presence of staining:
 - a. Nature and color of staining
 - b. Extent and location of staining or crusting from oxidations
 - 2. Inspect structural soundness of the stone. Note extent and location of:
 - a. Cracks
 - b. Settling
 - c. Block Movement
 - d. Pointing failure
 - e. Repairs
 - f. Moisture
 - 3. Examine condition of mortar joints:
 - a. Flaking
 - b. Powdering
 - c. Leaking
 - d. Cracking and Distortion
 - 4. Note nature, location, and condition of any surface coatings:
 - a. Pigment residue
 - b. Partial erosion
 - c. Cracks and crazing of coating

- d. Cloudiness
 - e. Gilding
 - f. Flaking or peeling of coatings
 - g. Bubbles or blisters in coating
5. Note location and condition of areas where water collects or pools:
- a. Standing water
 - b. Streaking
 - c. Pockets or perforations
 - d. Areas of biological growth
6. Note any loss of finish surface as evidenced by flaking or spalling; its extent, and location:
- a. Peeling and flaking usually follow uncorrected efflorescence or sub-florescence and represent a more advanced stage of failure.
 - b. Rust or corrosion may be evident in areas left unprotected as a result of coating loss through flaking.
 - c. Is the flaking or peeling localized or general in nature?
7. Look for areas with signs of erosion and/or wear and note the nature and location.
- a. Distinguish between erosion caused by environmental factors and normal exposure, versus that caused by human factors, such as touching or vandalism.
 - b. Carefully monitor and record all noted areas of erosion and wear. Use information gathered in planning for future stone maintenance.
8. Note presence, location, and type of graffiti.
9. Identify structural and/or mechanical problems and examine surfaces for evidence of movement, cracks, and breaks in the surface:
- a. Hairline cracks/crevices. Active or inactive?
 - b. Structural Cracks. Active or inactive? Assess whether monitoring is needed.
 - c. Broken and/or missing pieces
 - d. Damaged or shifting at joints
 - e. Corrosion jacking from embedded metals

3.03 GRANITE PROBLEMS AND DETERIORATION

- A. Blistering. A swelling on the surface followed by a rupturing of a thin, uniform skin.
 - 1. Typically caused by de-icing salts and/or groundwater, and usually localized near ground level.
 - 2. The condition may stabilize and remain constant; however, frequently precedes additional problems such as exfoliation or spalling.
 - 3. No effective treatment for the condition. Discontinued use of de-icing salts may slow the progress of the condition.

- B. Chipping. The separation of small pieces or larger fragments from a masonry unit, frequently at the corners, edges, or mortar joints.
 - 1. Result of deterioration and/or repairs, especially the use of excessively hard pointing mortar.
 - 2. Caused by impact resulting from accident or vandalism.

- C. Cracking. Appearance of narrow fissures ranging from less than 1/16 inch to 1/2 inch or more in width in the stone.
 - 1. Causes include structural overloading due to settlement, use of excessively hard mortar, corrosion of embedded metals, and/or flaws in the stone.
 - 2. Minor cracks, although not necessarily harmful, can be an indication of structural problems.
 - 3. Cracks can allow water entry promoting salt migration, further corrosion jacking and/or damage from freeze-thaw cycle.
 - 4. Repairs include patching and replacement.

- D. Detachment. Results from a failure of the construction system, connectors and/or joints.
 - 1. Failure of structural anchors or metal connectors that lead to detachment may be caused and/or accelerated by rust and corrosion caused by water penetration.
 - 2. Adequate pointing and caulking is required to prevent water entry into the structural system.
 - 3. The masonry unit may be removed, and the lost or failed component may be re-installed using appropriate mechanical techniques.

- E. Efflorescence. Deposit of soluble salts on the surface of the masonry. Natural efflorescence from new stones or mortar, which is washed away by rain or water washing, is generally not a problem; however, recurring efflorescence is an indication of other problems:

1. Improper chemical cleaning, too strong a chemical and chemical residue, inadequate rinsing.
 2. Rising damp and other water/moisture problems
 3. Exposure to de-icing salts, chemical landscaping treatments, or air pollution.
 4. Run-down from calcareous stone above (seen frequently on the granite water tables of limestone and marble buildings)
- F. Erosion. The wearing away of the material surface by the natural action of wind, windblown particles, and water. As granite's composition is hard, erosion is generally a less serious problem with granite than with other stones.
- G. Flaking. The detachment of small, flat, thin pieces of the outer layers of stone from a larger piece of stone.
1. An early stage of more serious problems such as peeling, exfoliation, delamination, or spalling.
 2. Caused by capillary moisture or freeze-thaw cycles, the result of application of water-repellent coatings that can trap moisture beneath the surface, and sub-florescence.
 3. To determine whether flaking is caused by sub-florescence, check for signs of whitish salt buildup.
- H. Peeling: Flaking away of the surface from the substrate in strips or layers.
1. Can result when improper application of masonry coatings leads to failure of the coating and/or stone surface.
 2. Can follow encrustation of the surface caused by chemical reactions with environmental elements.
- I. Rising Damp: The suction of groundwater into the base of masonry through capillary action. The level of water drawn into the stone may rise and fall according to conditions of temperature, humidity, site grading, absence or failure of damp courses, and/or treatments to the masonry surfaces that affect evaporation.
1. Associated with a darkened area near ground level during active or wet periods
 2. Can cause staining and efflorescence
 3. Can lead to problems such as flaking, peeling and spalling
 4. Corrected through elimination of water source or interruption of its path into the stone by physical or chemical damp-proofing.
- J. Spalling: The separation and breaking away of layers or small pieces of stone owing to sub-florescence, freeze-thaw, improper repointing (too hard mortar or portland cement), or structural overload. Less common in granite than in softer stones.

- K. Sub-florescence: Internal accumulation of soluble salts deposited under or just beneath the masonry surface as moisture in the wall evaporates. Salts enter the stone dissolved in rainwater or groundwater via absorption, rising damp, or poor joints.
 - 1. Can be caused by de-icing salts, chemical cleaners, landscaping products, mortar, and air pollution.
 - 2. Treatments include poulticing, removal of identified salt sources, elimination of moisture in the stone, and damp-proofing.
- L. Staining: A variety of stains may appear on stone, each having different characteristics.
 - 1. Bird droppings
 - 2. Corroded connectors within the masonry (rust stains)
 - 3. Salt crystallization (white efflorescence)
 - 4. Run-off from bronze or metal sculpture/ornament (green or rust-colored stains)
 - 5. Accretion of particulates (dirt, soot, etc.)
 - 6. Graffiti

3.04 LIMESTONE PROBLEMS AND DETERIORATION

- A. Weathering: Deterioration resulting from the natural effects of wind, rain, snow, thermal change, and atmospheric pollutants. Causes surface losses and loss of detail.
- B. Erosion: Erosion can be caused by weathering or other phenomenon. In some cases, wear can result in localized areas from contact with landscaping or mowing equipment.
- C. Staining. Discoloration, whether general or localized, is staining and can result from exposure to a variety of exterior substances or to internal occlusions in the stone or structural elements. Types of staining and causative agents include:
 - 1. Oil/grease stains generally resulting from vandalism or use
 - 2. Dyes and inks generally localized around area of contact.
 - 3. Organic stains caused by direct contact with decomposing organic matter such as bird or animal droppings, flowers, and tea or coffee.
 - 4. Metallic stains
 - a. Rust Stains are caused by oxidation of iron (rust) and usually result from water penetration that activates or accelerates rusting of iron structural or connecting components.
 - b. Copper stains are caused by copper salts (from copper or bronze) that wash onto the stone and then oxidize.

- D. **Crumbling/Sugaring:** Indicative of a certain brittleness or tendency of the stone to break up or dissolve. Also called sugaring when the limestone breaks up into small crystals that look and feel like coarse sugar. Stones generally have to be replaced when crumbling occurs. Causes include:
1. An inherent weakness in the limestone
 2. Gradual breakdown of the binder
 3. External factors affecting the strength and durability of the stone such as de-icing salts (called salt fretting), or any other source of salt migration (like rising damp).
- E. **Chipping:** The separation of small pieces or larger fragments from a masonry unit, generally resulting from deterioration and repointing, the use of excessively hard mortar, accident or vandalism.
- F. **Cracking:** Appearance of narrow fissures ranging from less than 1/16 inch to 1/2 inch wide or greater in the stone. Can result from structural overloading, inappropriately hard mortars, or a flaw in the material. Cracks that allow water migration require repair or replacement.
- G. **Detachment:** A result of a failure of the structural system (the connectors and joints), generally caused by water penetration, which in turn causes rust and corrosion of anchors and metal connectors. See Detachment under Granite, above.
- H. **Efflorescence:** Surface deposits of soluble salt; causes include leaching of salts from cement mortar, improper cleaning agents, rising damp, de-icing salts, chemical landscaping treatments, air pollution and acid rain. See Efflorescence under Granite, above.
- I. **Erosion:** The wearing away of the material surface by the natural action of the wind, windblown particles, and water. Causes loss of carved and incised detail.
- J. **Flaking:** The early stage of peeling, exfoliation, delamination, or spalling, evidenced by the detachment of small, flat, thin pieces of the outer layers of stone from a larger piece of stone. Generally the result of capillary moisture or freeze-thaw cycles that occur within the masonry.
- K. **Peeling:** Flaking of the stone surface from the substrate in strips or layers. May result from improper application of masonry coatings, from a defect in the stone, or from weathering. Encrustations of the surface caused by chemical reactions with environmental elements may also peel or flake along the bedding plane.
- L. **Rising Damp:** The rise of ground water through capillary action. The amount of moisture drawn varies due to conditions of temperature, humidity, site grading, absence or failure of damp course, and/or treatments to the masonry surface that affect evaporation. Can lead to a variety of problems.
- M. **Spalling:** The separation and breaking away of pieces of stone as a result of sub-florescence, freeze-thaw, improper repointing with hard mortar or portland cement, or structural overloading. Less frequent than with softer sedimentary stones.

- N. Sub-florescence. Internal and potentially harmful accumulation of soluble salts deposited under or just beneath the masonry surface as moisture in the wall evaporates. The build-up of salts and their crystallization can cause pressures that cause pieces to break off. Efflorescence at the surface is an indication that sub-florescence may be present. See Sub-florescence under Granite above.

3.05 MARBLE PROBLEMS AND DETERIORATION

- A. Weathering: Deterioration resulting from the natural effects of wind, rain, snow, thermal change, and atmospheric pollutants. Although marble has low porosity, it is highly reactive when exposed to acids, such as acid rain; coupled with the elliptical shape of the pores that allow greater dissolution, two major problems result:
1. Loss of polish
 2. Loss of detail
- B. Erosion: As with weathering above, wind-driven, airborne abrasives such as dirt, grit, and other particles may wear away detailing.
- C. Staining: Discoloration of the stone. Some types of staining and causative agents are:
1. Oil/grease stains generally the result of vandalism or handling. Substances may be absorbed into the stone upon contact. The depth of penetration depends on the viscosity of the oil/grease, temperature, stone porosity, finish and dryness.
 2. Dyes and inks (see under Limestone).
 3. Organic stains (see under Limestone).
 4. Metallic stains (see under Limestone).
 5. General dirt, soot, and pollution. Marble can be discolored by atmospheric dirt, grim, and other airborne particulates which adhere to the material and can result in a dull or gray appearance. Dirt can become incorporated into crusts. Biological agents can collect on dirty surfaces and stimulate algal growth. Algae, lichens, and moss can produce acid by-products that damage the acid-sensitive stone. Some waterproof and water-repellent coatings increase static attraction that results in the stone getting dirty faster.
- D. Crumbling/Sugaring: The gradual disintegration of the surface of the marble possibly caused by salt migration and exposure to moisture. Excessive moisture may have the effect of dissolving the binder. Carbonate stones, especially fine-grained marbles, are particularly susceptible to this form of deterioration. The surface takes on a rough granular, dry crystalline, or sometimes powdery appearance. Also see under Limestone.
- E. Chipping (see under Limestone).
- F. Cracking (see under Limestone).
- G. Detachment (see under Granite).

- H. Efflorescence (see under Granite).
- I. Erosion (see under Limestone).
- J. Flaking (see under Limestone)
- K. Peeling (see under Limestone)
- L. Rising Damp (see under Limestone).
- M. Spalling: Less frequent with marble than with sedimentary stones, which are less dense.
- N. Sub-Florescence (see under Limestone).

3.06 SANDSTONE PROBLEMS AND DETERIORATION

A. Natural and Inherent Problems

1. Moisture-related problems. Evident in sandstone as spalling, erosion, cracking, flaking, and deteriorated mortar joints. See specific categories under Limestone.
2. Weathering. Disintegration of the stone's surface usually caused by erosion, chemical action, and moisture freezing in the stone (freeze-thaw).
3. Exfoliation. Separation and loss of large areas of stone along the bedding planes, usually caused by the stone having been face-bedded
4. Blind Exfoliation. Separation of stone along bedding planes, but where layers are still loosely attached behind the surface. It is often caused by having laid the stone with the bedding planes running parallel with the surface of the wall (face-bedding). Blind exfoliated stone will sound hollow when lightly tapped with a rubber mallet.
5. Blistering. Swelling and rupturing of a thin uniform skin caused by air-borne chemicals reacting with the stone surface, forming a hard, brittle skin. Blisters will often pop when touched.
6. Cracking. Narrow fractures in the stone (see Cracking under Limestone).
7. Detachment. A clean break in the stone often resulting from sharp impact, or from stresses concentrated in a small area of stone as a result of structural settlement.

B. Human-Induced Problems

1. Stone laid with its layers parallel to the wall plane (face-bedded) rather than perpendicular to the wall plane (naturally-bedded). Face-bedded stone is more prone to deterioration by weathering as entire sheets of stone tend to flake off.
2. Painting over a deteriorated stone surface, which leads to more serious moisture-related problems.
3. Application of cement patch over deteriorated surfaces.

3.07 FINAL REPORT

The Contractor shall provide a final report of completed work including all approved submittals and photographs of work taken before, during, and after completion.

END OF SECTION