Massachusetts State House
Design Guidelines

Final Review Draft

prepared for the
Commonwealth of Massachusetts
Bureau of State Office Buildings
Division of Capital Asset Management

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TO: All State House occupants and those involved in renovation and maintenance
From: Carole Cornelison, Superintendent, Bureau of State Office Buildings

The attached documents comprise the *State House Design Guidelines* which will apply to all interior work in the building. The *Guidelines* recognize the historic significance of the State House, identify requirements for the care of its materials and cultural resources, and provide criteria for building improvements. The *Guidelines* are intended for use by three primary audiences:

- State House occupants (elected officials and staff and other employees),
- Staff from the Bureau of State Office Buildings and the Division of Capital Asset Management who typically manage work in the State House; and
- Contractors, designers, vendors and others conducting construction work or major maintenance activities.

The *Guidelines* include an overview of State House historic features and are supplemented by a second volume of reference documents to guide the preservation of these unique conditions. To support continued use of the building, the *Guidelines* cover various types of interior work and promote careful planning, design, construction and maintenance according to best practices. Procedures for review of proposed projects are also outlined within. Throughout, the *Guidelines* are governed by principles of safety, protection of cultural resources, sustainable and efficient use of resources, and universal accessibility.

The stewardship of this most significant Commonwealth building is dependent on our combined efforts. We welcome your questions and comments on these *Guidelines*.
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Executive Summary

The Massachusetts State House is a National Historic Landmark and one of the most architecturally and culturally significant buildings in the United States. Throughout three major periods of construction from 1787 to 1917, the building has grown to encompass more than 600,000 square feet of executive, legislative, and public programmatic space. Contemporary additions include the 1950s museum and the creation of the Great Hall in the 1980s. Preservation of this historic treasure requires a heightened and disciplined level of care, undertaken according to an appropriate set of directives.

The Massachusetts State House Design Guidelines (Design Guidelines) will provide direction for all future use, care, and rehabilitation of the building’s interior spaces that may be required to sustain a safe, comfortable and efficient environment for its occupants, while preserving the State House as an historic landmark. The Design Guidelines will be used by all those involved in the planning, review, implementation and oversight of construction, redesign, and maintenance work of all types.

The Design Guidelines define and illustrate the following four topics: Preservation Standards, Rehabilitation Strategies, Historic Material Treatment, and the Review Process.

Preservation Standards

The Design Guidelines are based on the U.S. Secretary of the Interior’s Standards for the Treatment of Historic Properties (1995) and related international conventions. Based on the 2008 Master Plan Study, this document classifies spaces within the State House into five Levels of Significance based on historic merit. The standards described in this document address each of the five levels of significance.
Rehabilitation Strategies

The implementation of rehabilitation strategies must balance the retention of historic significance and character defining features against the functional needs for usage in the State House. The Level of Significance for each space determines the priorities for preservation and restoration. Beyond these goals, the design of new features or building systems to enhance a space should be both appropriate and compatible. The Design Guidelines provide examples varying from the adaption of existing historic features to the concealment of new interventions.

In summary, strategies for the rehabilitation of State House interiors should:

- Express and reveal historic features;
- Minimize the visual impact of interventions and new building systems;
- Utilize updated technologies to highlight historic features;
- Avoid design interventions that obscure existing historic elements;
- Design new interventions to a level of architectural quality and durability that are appropriate to existing construction;
- Design new interventions that are clearly differentiated yet compatible with historic features in regard to their material, size, scale and proportion;
- Execute new work in historic spaces in a manner that is reversible without damage to significant materials and features.

Figure 2  View of Great Hall of Flags, completed in 1990.
Historic Material Treatment

The routine maintenance of historic materials provides the best insurance for their long-term preservation. Cyclical maintenance plans should be developed and implemented for historic materials as they currently exist, and then re-evaluated following any restoration or rehabilitation projects.

In cases of deterioration, the restoration of historic materials will require repair or replacement. Restoration treatment should only be undertaken by firms or individuals that have demonstrated experience in work that is similar in nature, design and scope to the work that is proposed. Project designers and contractors must be familiar with conditions that may be imposed by the regulatory and preservation agencies that may be involved in reviewing publicly funded work.

Interior Design Guidelines

The process for interior design improvements includes four developmental phases: Evaluate, Plan, Recommend, and Review. The Evaluation phase requires fulfillment of a State House “Room Data Sheet” to record existing spatial conditions, analyze occupant needs, and initiate the design planning process.

For new office and work environments, the Design Guidelines provide a “Kit of Parts” defining building components for consistent application throughout all branches of the State House. Recommended manufacturers and types of products are listed for Partitions, Doors, Desking Systems and Workstations, Seating, and Storage. For project types other than office improvements, additional criteria may be established by State House project managers.
In many cases, the functional improvement of an interior space will demand extensive overhaul of all associated building systems. This scope of design, including structural, mechanical, electrical, plumbing, acoustical, and lighting engineering, must be coordinated to minimize any adverse effect to existing character-defining architectural features.

Access to natural light within office zones should be maximized when reconfiguring existing spaces. When the existing qualities of acoustics or lighting are insufficient for existing or proposed use, any improvement should conform to historic distinctions of the space’s ceiling and wall designs and complement any historic lighting fixtures. In general, every effort should be taken to conceal new systems and preserve adjoining historic fabric.

All project types shall consider a range of spatial configurations and design alternatives to achieve desired outcomes. In conclusion, a preferred alternative should be identified based on a full assessment of project opportunities and constraints. Project designs are subject to review prior to procurement.

**Review Process and Tools**

The *Design Guidelines* are administered by the State House Design Council, a cross-disciplinary body of key stakeholders who are responsible for this edifice. This body reviews plans for any and all projects that will affect the interior spaces. The Design Council meets monthly or as needed to review project improvement applications and plans or to provide directions and recommendations.

Staff of the Division of Capital Asset Management (DCAM), the Bureau of State Office Buildings (BSB), and the Massachusetts Art Commission will be assigned to oversee implementation of all approved projects. The review staff will also ensure on behalf of the Design Council that there is strict adherence to all prescribed design criteria and historic material treatments.
Summary for Guideline Users

1. The *Design Guidelines* are an extension of the State House Master Plan and support the Commonwealth’s objectives for the preservation and efficient use of the State House.

2. The *Design Guidelines* apply for all interior construction and major maintenance work in the State House. All such work will be subject to:
   - applicable required procurement processes for planning, design, and construction,
   - review by the State House Design Council, and
   - required regulatory reviews and permits.

3. The *Design Guidelines* provide:
   - Classification of State House interiors by their historic significance and regulations for their use, treatment, and potential for rehabilitation (see Section 1).
   - Preservation standards and appropriate strategies for rehabilitation of State House interiors (see Section 1).
   - Guidance for treatment of historic materials (see Section 2).
   - Guidance for efficient interior design (see Section 3).
   - Process for project initiation and review, including a standardized Room Data Sheet for collaborative development by State House users and Bureau of State Office Building staff (see Section 4).
   - Detailed technical and reference material (see Appendices).
1 Preservation & Rehabilitation

Introduction

Section 1 defines the recommended treatment of State House interiors, including both the maintenance of existing conditions and proposed rehabilitation. The Design Guidelines are based on the designation of five Levels of Significance. These levels are applied to State House interiors according to their relative historic, cultural, and artistic significance.

This section will demonstrate:

- Application of preservation standards for the treatment of all State House spaces and features
- Hierarchy of Preservation Levels with illustrative examples
- Characteristics of preservation methodologies, and their application to preservation levels
- Philosophical approaches to the sensitive rehabilitation of historic interiors
Definitions for Historic Preservation Terminology

**Preservation**
The act or process of applying measures to sustain the existing form, integrity, and material of a building, structure, or site. This treatment focuses on the maintenance and repair of existing historic materials and retention of a resource's existing elements.

**Rehabilitation**
The act or process of returning a property to a state of utility through repair or alteration which makes possible an efficient contemporary use while preserving those portions or features of the property which are significant to its historical, architectural, and cultural values.

**Repair**
To replace or correct broken, damaged or faulty components or elements of a building. Repair is the principal method of preservation and restoration treatment.

**Replacement-in-Kind**
To reproduce, by new construction, the exact portion or detail of an extensively deteriorated or missing feature. The new construction must match the design, profile, material, and general appearance of the originals. If in-kind materials or techniques are unavailable, then compatible new materials and techniques that match the old in design, color, texture, and other visual qualities may be appropriate if the application of the substitute material does not damage, destroy or obscure historic features.

**Restoration**
The process of returning an existing building, structure, or site as nearly as possible to its condition at a particular time in its history, using the same construction materials and methods as the original where possible. Typically the period of greatest historical significance or aesthetic integrity is chosen. Work may include removing later additions, making hidden repairs, and replacing missing period work.
Stabilization

Treatment procedures intended to maintain integrity and minimize deterioration, particularly during emergency conditions.

Principal References

The Massachusetts State House Design Guidelines (MSHDG) are based upon the United States Secretary of the Interior's Standards for the Treatment of Historic Properties (1995). The document remains the most well-regarded and frequently used set of preservation standards and guidelines in the United States. The MSHDG are additionally informed by accepted international conventions for the treatment of historic properties. These include the Venice Charter (1964) authored by the International Council on Monuments and Sites (ICOMOS) and the Convention Concerning the Protection of World Natural and Cultural Heritage (1972) of the United Nations Educational, Scientific, and Cultural Organization (UNESCO). In addition, the preceding definitions were developed based on the following sources:


Preservation Standards

Application to Levels of Significance

Spaces and features within the State House are classified into five Levels (I-V) of Significance, based on their historic or innate architectural merit. Although the building exterior is not specifically addressed in the Guidelines, it is subject to review by the Massachusetts Historical Commission.

The same high standard of care shall be applied to all historic fabric, regardless of the ranking of the space. Whenever possible, deteriorated historic fabric should be repaired rather than replaced. Where the severity of deterioration requires replacement of a significant feature, the new feature shall match the historic in design, color, texture and, where possible and appropriate, materials. The need for replacement due to the severity of deterioration shall be justified by scientific methods, such as materials analysis or performance testing, as well as aesthetic considerations in regards to the normal effects of aging. Re-creation of missing features shall be substantiated by documentary, pictorial or physical evidence. Materials used for the stabilization and conservation of existing materials shall be visually and physically compatible with the original materials. Any and all material deemed to be historic fabric within the State House, regardless of the Level of Significance of the space shall be treated with the procedures and level of care described in the material treatment guidelines (Section 2).

Adjacent Levels of Significance

In areas where spaces intersect or visually overlap, it is vital to consider sightlines and the quality of views from one space to another. Spatial continuity and integrity contribute to significance, and their maintenance is fundamental to the preservation of the historic architectural character of the State House. Where adjacent spaces have different Levels of Significance, areas with views from one space to the other shall generally be treated in accordance with the higher standard.

Non-Contributing Spaces

Non-contributing spaces are those without historic or architectural significance to the character of the Massachusetts State House. Aside from isolated historic features that exist within some of the spaces, in general these areas may be altered as required to best meet
programmatic requirements, provided these alterations do not detract from the quality and visual perception of adjacent historic spaces.
Level I Significance

These spaces convey the dignity and cultural importance of State Government, exhibit the highest quality of architectural and artistic craft, and retain the greatest integrity in their historic fabric. The inventory of spaces represents multiple periods in the State House history and covers a period of more than one-hundred years. Because of this constant development, there are instances where more than one historic period may be represented in one space. When work is performed in these spaces, features shall be restored to the greatest degree possible based on the most reliable and substantiated historic documentation.

**Preserve:**
- overall spatial appearance, and
- historic architectural and artistic features.

**Restore:**
- damaged features with priority for retention of original material, and
- missing and/or damaged features resulting from alterations over time (subject to substantiating evidence).

**Rehabilitation shall:**
- maintain current use,
- minimize alterations to existing spaces,
- select new architectural features and furnishings to adopt form, material, color and detail of historic fabric, and
- conceal new building systems where possible.
Level II spaces are important to the overall history and use of the State House and possess architectural significance from oldest period of construction. Significant alterations have occurred over time, both to the physical fabric and to the use of the space. Alterations should be evaluated for their contributing significance prior to any spatial rehabilitation. Surviving original material palettes should be preserved.

Level II Significance

These spaces also represent the essential character of the State House but possess a slightly lesser quality, level of architectural integrity or cultural importance than the Level I spaces. They include circulation areas, galleries, and certain highly-crafted office suites that are immediately adjacent to Level I spaces. In most cases they have experienced significant alteration from their original historic form. When work is performed in these spaces, features shall be restored to the greatest degree possible based on the most reliable and substantiated historic documentation.

Preserve:
- overall spatial appearance, and
- historic architectural and artistic features.

Restore:
- damaged features with priority for retention of original material, and
- missing features (subject to substantiating evidence).

Rehabilitation shall:
- maintain current use unless programmatic conditions demand otherwise,
- minimize alterations to existing spaces,
- select new architectural features and furnishings that are appropriate and compatible with historic fabric, and
- conceal new building systems where possible.
Level III Significance

These spaces exhibit traditional craftsmanship but are less ornate than those found in Levels I-II. They possess less significance in defining the historic character of the State House. Spaces include office suites and circulation areas. In some cases, significance may be limited to individual architectural features. In those areas, replacement in-kind of finishes or alteration of interior configurations may be suitable. However, original materials should be protected and restored where necessary, with particular care for retention of early wall and ceiling treatments.

Preserve:
- historic architectural and artistic features.

Restore:
- damaged features with allowance for material replacement in-kind.

Rehabilitation shall:
- sensitively adapt or alter spaces for new use,
- select new architectural features and furnishings that are appropriate and compatible with historic fabric, and
- conceal new building systems where possible.

Level III spaces primarily include office space.

Individual architectural elements within spaces are significant, including ceiling and cornice trim, and door surrounds.

Over time, major alterations have affected interior layouts and walls. Original material palettes have been compromised on some surfaces.
Level IV Significance

These spaces show moderate design merit and have features which are worthy of protection. They are largely represented by offices and hearing rooms throughout the wings and the lower levels of the Brigham Extension. Many of the intact office suites retain decorative mantel pieces and run plaster wall cornices. Replacement in-kind of finishes may be acceptable and these spaces are more appropriate for alteration of their interior configurations. However, original materials should be protected and restored where necessary, with particular care for retention of early wall and ceiling treatments.

Preserve:

- historic architectural and artistic features.

Restore:

- damaged features with allowance for material replacement in-kind.

Rehabilitation shall:

- sensitively adapt or alter spaces for new use,
- select new architectural features and furnishings that are appropriate and compatible with context, and
- integrate new building systems within overall space design.
**Level V Significance**

These are modest spaces though they may retain features that should be preserved. Similar to Level IV spaces, these interiors are mostly located throughout the wings and the lower levels of the Brigham Extension but have experienced widespread and extensive alteration. Further loss of their historic features should be avoided. Future work should be appropriate and compatible to their original treatments, but they do not merit restoration unless desired and subject to substantiating evidence.

**Preserve:**
- historic architectural and artistic features.

**Restore:**
- damaged features with allowance for material replacement in-kind.

**Rehabilitation shall:**
- sensibly adapt or alter spaces for new use,
- select new architectural features and furnishings that are appropriate and compatible with context, and
- integrate new building systems within overall space design.
Rehabilitation Strategies

Much of the work proposed in the 2008 State House Master Plan can be categorized as rehabilitation. As defined, this type of treatment includes repairs and/or alterations to improve the utility of an existing building or allow new use. The rehabilitation of a landmark building demands a unique approach to design and construction in order to preserve those aspects that are significant to its historical, architectural, and cultural value.

Designs for rehabilitation will be influenced by programmatic needs, project scales, and the Level of Significance for the existing spaces. However all new work in the State House should adhere to principles of appropriateness and compatibility. These principles do not discourage creativity within the design process, but rather suggest that new design should be inquiry-based, explore alternative solutions, and utilize analysis to determine a preferred treatment. Ultimately these design solutions, or “interventions”, should balance the functional needs for improvement against the potential risk to the State House’s historic significance and character-defining features.

Appropriateness reflects the consideration of historic and cultural values during the design process. For a building such as the State House, there is a collective responsibility to serve as stewards for its continued significance and use. The determination of appropriateness is directly related to the levels of significance assigned to all State House interiors. Compatibility qualifies those interventions or treatments that do not lead to technical or aesthetic damage to historic materials. Best practice of these principles:

1. Expresses and reveals historic features wherever extant and possible;

2. Minimizes the visual impact of functional interventions, and uses new and updated technologies (such as lighting) to highlight historic features when feasible;

3. Refrains from imitative design interventions that obscure or blur the distinction with existing historic elements, or which are not appropriate to the period of historic significance;

4. Designs new interventions to be at a level of architectural quality and durability appropriate to the existing surrounding construction;

5. Designs new interventions to be clearly differentiated yet compatible with the historic features in material, size, scale, and proportion; and

6. Executes new work in historic spaces that is reversible without damage to existing significant materials and features.
Three Approaches to Intervention

The following text describes three different approaches to rehabilitation of historic interiors – extension, dialogue, and contrast.

Extension

In many cases, particularly in Level I and II spaces, improvements are recommended to supplement and enhance the conditions of historic interiors. These improvements are prompted by the modification of building systems or the addition of services and functions that were not originally required or intended for the space.

The "extension" design approach seeks to enhance and extend the design concept and language of the existing historic fabric through interventions to accommodate necessary change. In some cases this may suggest the subtle addition of an architectural feature to house or enclose a new building system. In other cases, a material palette may be adopted to provide a new form, such as the wheelchair accessible ramps already installed in some State House corridors.

For example, wheelchair accessibility throughout the State House is affected by the discontinuity of floor levels due to original designs or building expansions. For the recent

Figure 4  Outdated wheelchair platform stair lift.  Figure 5  Replacement wheelchair lifting platform.
restitution of an outdated platform stair lift, the existing material palette of a Bullfinch corridor was adapted to enclose a new motorized platform. This example of the "extension" approach to intervention concealed the new system within an architectural enclosure based on adjacent historic features.

**Dialogue**

Many State House interiors, particularly in Level II and III areas, will require an intermediate strategy to address the loss or alteration of historic fabric and changes in use. In these spaces, the visual presence of new interventions will be undeniably greater, so there needs to be a clear sense of dialogue between the old and new interventions.

Subsequent rehabilitation of many State House office interiors have compromised historic ceiling and wall surfaces and replaced original lighting with unsympathetic contemporary fixtures. For future stages of rehabilitation, the State House Master Plan has recommended restoration of the walls and ceilings. As an example of the "dialogue" approach, historic lighting systems may be retrofitted with new efficient fixtures (Figure 6) or completely new systems may be installed which highlight an interior's historic spatial features (Figures 7).

The strategy of "dialogue" is also appropriate for larger interventions and partition modifications, such that the new construction acknowledges the character of the existing fabric through its divisions and regulating lines, through the use of proportion, and through the use of a high-quality material palette.
Contrast

A third intervention strategy is applicable in areas of lesser historic significance and promotes deliberate and careful contrast. In these cases, a new intervention may differ greatly from the detail or material of its historic context, but does so in an inconspicuous or minimal fashion. The degree of contrast should not be excessive and should utilize the advancements in technology which have enabled contemporary building features and systems to be more compact or transparent than traditional installations.

An example is demonstrated by the creation of the Great Hall within a former open-air light-well. In this project, original exterior walls were enclosed by a skylight to form a new interior space. Former window openings were modified as doorways, while retaining the character and shape of their original masonry framing.

Spaces where no historic fabric is visible (at present or in the proposed rehabilitation) should employ the strategy of “contrast” by not attempting to replicate the forms of the historic spaces and fabric but rather to complement them with spaces that are as light and open as is feasible for that space as determined by its proposed use. These are most frequently office spaces where the ‘Kit of Parts’ outlined in Section 3 of this document is most applicable.
With the exception of intentionally reversible work added to historic spaces, all work completed in this strategy of contrast should have permanence and be of a durable construction befitting the building’s public uses.
Level of Significance Plans

The following plans designate the five Levels of Significance assigned to State House interior spaces. Spaces shaded dark grey are not identified with a particular historic significance. Red dots denote locations of current or historic interior windows.

![Levels of Significance](image)

Figure 10 Historic interior window.
Figure 11  Sub-Basement Plan
Figure 12  Basement Plan
Figure 13  First Floor Plan
Figure 14  Second Floor Plan
Figure 15  Third Floor Plan
Figure 16  Fourth Floor Plan
Figure 17  Fifth Floor Plan
2 Historic Material Treatment

Introduction

Section 2 describes the characteristics of historic interior materials and artistic features within the State House. Summary narratives provide recommendations for their preservation during routine facility maintenance and repair or restoration treatment during State House improvement.

This section will demonstrate:

- Overview of artwork located in State House interiors
- Historic context of unique and rare building materials, craftsmanship, and artistry
- Locations of historic building materials and their relation to phases of State House construction
- Criteria for preservation maintenance, professional expertise, and subsequent treatment of historic building materials
Principle References
The following assessment and overview of existing historic materials is based on research and investigation contained within The State House Historic Structure Report (1985) prepared by Ann Beha Associates. Although more than two decades old, the document remains the most comprehensive record of surviving historic features and should be consulted prior to any preservation or restoration work.

General Standards for Care
The Massachusetts State House retains a wide range of original 18th through 20th-century interior materials including plaster, iron, bronze, brass, wood, stone, ceramic tile, terra cotta, and ornamental glass. These surviving features contribute to the historic significance of the State House, and therefore require an appropriately high standard of care during all proposed work within the building. The treatment guidelines outlined for each material in this section are based upon the U.S. Secretary of the Interior’s Standards for the Treatment of Historic Properties.

For a detailed description of the Standards, refer to Appendix A.

The following standards of care are intended for all materials or features described herein, regardless of their specific location within the State House or their designated preservation zone. All instances of these materials should be treated on a uniform basis. The following special conditions apply to multiple types of historic materials.

Routine Maintenance
The routine maintenance of historic materials is the best and, in the long-term, most cost-effective method of preservation. To minimize the impact of daily use on the State House historic fabric, maintenance plans should be customized for individual interiors and their respective historic materials.

In addition to routine operations, maintenance plans must also outline procedures for monitoring conditions, particularly as they may be affected by inclement weather, peak occupancy and visitation, or during construction. The plans should include directions for addressing maintenance issues that arise from these and all other conditions, according to specific materials. Attention shall be given to types of equipment, tools, materials, solutions and frequency of application to insure routine, gentle, and appropriate cleaning and maintenance methods. Once implemented, the State House custodial operations should strictly follow the maintenance plan procedures. It is crucial that all in-house personnel, as
well as outside contractors, be educated on the required standard of care whenever working in or around this historic building.

**Source Pollutant Control**

The presence of exterior soil particles and airborne pollutants can significantly damage historic materials. Due to the State House’s size, urban location, and heavy interior foot traffic, proper controls should be implemented, including careful monitoring of air filtering systems, cleaning of vents and grates, installation of appropriate window controls, frequent care of entrances, and the strategic placement of door grates, mats and/or area rugs.

**Neutral Cleaners**

For all cleaning applications, the process should begin with the gentlest means possible. To remove soiling and stains, many of the material Treatment Guidelines specify the use of neutral cleaning agents. Neutral cleaning agents are defined as having a pH factor between 7 and 10, and are formulated to react only in solution with clean water. These agents should be mixed and applied in accordance with the manufacturer instructions. Any product should first be tested on a small, inconspicuous area. For any strength of cleaning agent, the concentration (ratio of agent to water) and dwell times (duration of surface exposure) should be determined during a process of testing by an experienced craftsman or technician.

Before cleaning most porous masonry and tile, the surface must be pre-wetted to prevent any deep saturation of the cleaning solution into the material. Even neutral cleaning agents can potentially react with the salts in masonry or tile to cause efflorescence, which is a whitish haze of water-soluble salts. Appropriate allowances for testing and observation are critical to prevent this condition which can stain and streak stone, brick and terra cotta, or may even cause minor spalling around joints.

**Expertise**

While many routine maintenance procedures will be performed by in-house personnel, the following Treatment Guidelines specify certain cleaning procedures that should include expert consultation to insure long-term material preservation.

All references under Restoration Treatment assume work is undertaken by firms or individuals who have demonstrated experience in treatments of a similar scope and nature, including work in buildings listed, or eligible to be listed on the National Register of Historic Places. In addition to industry codes of ethics and standards for practice,
restoration contractors should adhere to terms imposed by regulatory and preservation agencies as identified in the project design. A qualified field supervisor shall be assigned to the project and present at all times during execution of services, directing all workers and serving as liaison with State House project managers. Additionally, all workers should have documented experience in the services they will be performing.

- For a detailed description of professional qualification standards, refer to Appendix B.

**Environmental Regulations**

It is important to note that historic materials were often created using processes that today may be in rare practice. In some cases, the finishing or restoration of these materials was performed using volatile organic compounds (VOCs), which are now highly regulated. Alternatives to the use of VOCs may be possible, but this determination should be made with a conservation specialist following a comparison of treatments and environmental controls.

- For a detailed description of Sustainability, refer to Section 4.

**Project Documentation**

All treatments shall be thoroughly documented to record conditions before, during and after completion of services. Existing conditions shall be recorded by labeled photographs, drawings, or both as deemed appropriate by project designers. For many projects, minimum documentation requirements, including formatting, organization of reports, databases, etc., should be specified in the contract for services. Treatment logs and detailed descriptions of materials and suppliers should also be maintained by the contractor, especially when substitutions or change orders have been authorized. Following project completion, DCAM/BSB project managers will submit records to appropriate state agencies.

**Removal and Salvage of Historic Materials**

During some projects, historic materials may be designated for selective removal and salvage. Prior to removal, the existing conditions of the materials should be fully documented with drawings and photographs. As well, photography should be used to document existing construction revealed as surface elements are removed during work. All elements to be salvaged and reinstalled shall be labeled with the room from which they came and the assembly (e.g. base, wainscot, etc.) and general location (e.g. east wall, mezzanine, etc.).
During removal, storage, and any reinstallation, historic materials should be protected from damage and deterioration caused by or resulting from abrasion, impact, water (trapped moisture, condensation, and humidity level), vibration, soiling, staining, and/or marking. As well, protection must prevent damage and deterioration caused by stresses and strains induced during removal, handling, transportation, and storage, including, but not limited to, cracks, breaks, and deformations. During storage, the materials should be made available for inspection at either the architect or owner’s request.
Art Collection

Description & Locations
The Massachusetts State House Art Collection includes paintings, sculptures, plaques, wall murals, historic artifacts, and significant decorative arts installed throughout the public spaces and private offices of the State House. The collection commemorates significant historical events, elected officials and private citizens who have shaped the course of the Commonwealth.

Treatment & Conservation
The collections are inventoried and overseen by the Massachusetts Art Commission (Massachusetts Gen. Law Chapter 6, Sections 19 and 20) which acts as curator, and is responsible for their care and treatment.

Many items within the collection are large-scale or permanent features of State House interiors, including numerous painted wall murals. The proximity of the artwork to
architectural features requires special precautions when performing any building maintenance or construction in these areas. Therefore the Massachusetts Art Commission must be contacted in advance of any project planning in areas either including or adjacent to State House artwork.

Artwork protection must be determined in coordination with the Massachusetts Art Commission on a case by case basis. In general, artwork is more sensitive to environmental conditions than historic architectural features. Damage to artwork can result from fluctuations in relative humidity/temperature, insufficient ventilation, or exposure to moisture, ultra-violet light, or air-borne contaminants, among other causes. During a period of construction, the level of risk is elevated by the potential for fire, exposure to solvents and chemicals, water leaks, physical damage, and theft. To insure protection, measures & precautions may include:

- When possible, relocation & off-site insured storage of artwork during construction.
- If to remain, specialized in-situ protection & environmental monitoring
- Require dust control measures.
- Limitation of construction material & tools storage.
- Protective guidelines for welding, brazing, and other “hot” work.
- Require contractor conformance with NFPA 241 “Standard for Safeguarding Construction, Alteration, and Demolition Operations”.
- Require that wet piping systems be pressure tested with air prior to filling with water or hydrostatic testing.
Plaster & Gypsum

Material Description

Until the end of the 19th century, the principle ingredient of architectural plaster was lime. Lime plaster was made from four ingredients: lime, aggregate, fiber, and water. The lime came from ground-and-heated limestone or oyster shells; the aggregate from sand; and the fiber from cattle or hog hair. Manufacturing changes at the end of the 19th century made it possible to use gypsum as a plastering material. Gypsum and lime plasters were used in combination during the early part of the 20th century; gypsum was eventually favored because it set more rapidly and, initially, had a harder finish. Within the State House, it is assumed that most existing plaster is a combination of lime and gypsum plasters for base and finish coats. In cases where new replacement or new installation is adjacent to existing plaster, testing can determine the exact mixture of the original to ensure compatibility.

Assemblies & Locations

Plaster is a common interior material in the State House and used extensively as the finish surface for ceilings and walls in chambers, corridors, and offices as well as for decorative applications.

Installation of flat plaster traditionally involved application of three successive coats - a “scratch” coat followed by a “brown” coat and a “finer” finish coat. The ornamental surfaces of State House interiors also include the use of run-in-place or cast plaster. Molding plaster consists of finely ground gypsum and hydrated lime, typically executed with a running mold, requiring a template cut and pushed to form moldings between
walls and ceilings. More complex, three-dimensional details such as Corinthian column capitals, rosettes, and modillions, were cast in molds and then incorporated within the final surface treatment. Traditionally, these ornaments were cast in hide glue (gelatin) or plaster molds in an off-site shop, often in more than one piece, then assembled and installed in the building.

Plaster surfaces are finished with paint, and in some spaces poly-chromatic schemes were used. Fresco-secco is a decorative painting technique in which watercolors are applied to moistened dry plaster. This artistry was popular in the 19th century and was used to add architectural detail to the dome of the House Chamber. In other spaces, such as the Library, original painted decorations have been concealed by a uniform application of standard interior paint.

One of the most notable examples of plasterwork is found in the Governor’s office which features the original design of the first State House architect, Charles Bulfinch. Also within the historic core of the Bulfinch Block, the ceiling of the current Senate Chamber (Figure 21) includes areas of original flat plaster in the low arched tympanums below the dome and figurative bas-reliefs in the pendentives.

**Routine Maintenance**

Plaster requires little maintenance beyond routine dusting and cleaning of surfaces. Neutral cleaners may be required to remove excessive soiling or staining on the painted finish layer. Ornamental surfaces should be cleaned regularly to avoid the excessive build-up of airborne dust particles. Re-painting plaster should not be a remedy for infrequent surface cleaning, as additional paint layers can drastically diminish the detail of ornamental plaster. Most ornate plaster is located in hard to reach areas, such as wall cornices or ceiling coves. Custodial access during non-business hours should be regularly scheduled to allow cleaning of these high surfaces.

**Restoration Treatment**

Existing historic plaster within the State House exists in varying degrees of condition. Damaged or deteriorated plaster is primarily due to underlying structural movement and/or water seepage. For example, chronic water penetration at the roofing above the House Chamber has caused damage to the dome, cornice and upper wall plaster in the north and southwest sections of the room. In other instances, excessive loading from new equipment installation has lead to damage from structural movement.
Prior to undertaking any repairs to deteriorated plaster, it is critical to first determine and alleviate the cause of the damage. Once both the cause and extent of damage have been determined, treatments such as shoring and stabilization of the existing plaster may begin. All soft, broken, loose, delaminated, non-adhering, and flaking plaster should be carefully removed to the level of a sound substrate. Completed areas of removal should have clean and sharp edges. More extensive removal may be required to eliminate surface imperfections such as blisters, excessive cracking, efflorescence, and similar surface defects caused by a loss of bond to substrate. Replacement lath should either be riven-hardwood or expanded metal to match the existing assembly.

Other repairs to flat plaster include filling hairline cracks with new plaster to achieve a flush and smooth surface. Larger cracks may require a channel cut along full length of crack with a sufficient width to install new plaster and attain a tight bond.

The replacement plaster mix design should match as closely as possible the original plaster being repaired, with the end result being a smooth surface without evidence of patching. In most State House conditions a 3-coat plaster system (scratch, brown, and finish coats) will be applied by hand to match adjacent plaster surfaces in both texture and finish.

The restoration of ornamental plaster is more complex due to the presence of hand-sculpted or molded designs. The replacement of damaged or missing serial features, such as modillions and other repetitive ornament, should be created by a new mold of surviving intact features. Such features should never be replaced with standardized or “similar” components. As noted in Routine Maintenance, excess painting of cast features should be avoided in order to preserve their detail of their ornament.
To accurately replicate plaster finishes, it is critical to perform small, in-place mockups prior to execution of a wall or ceiling repair. Review of these samples will allow modification of proposed plaster mixtures and application techniques to ensure acceptable matching of finishes. When duplicating run-in-place plaster, an experienced craftsman is crucial to a successful repair.

Historic paint schemes or patterns may be reproduced following paint investigation and analysis by a conservator. Samples of existing surfaces may be collected to determine the sequence of paint finishes and identify originally applied colors.
## Material Treatment  
### Plaster & Gypsum

### Primary Types
- Flat
- Run-in-place
- Cast or molded
- Gilded finishes
- Painted finishes, including *faux* finishes, *fresco-secco*, and grain-painting

### Assemblies & Locations
- Walls and columns
- Mouldings, door casings, window casings
- Composite ornament
- Flat ceilings
- Coffer and patterned ceilings

### Problems of Repair
- Wear and tear, staining, abrasion
- Settlement
- Moisture penetration
- Cracking, spalling
- Over-paint

### Special Conditions
- Routine Maintenance: *Regularly dust plaster surfaces, particularly all horizontal faces. Monitor for early detection of any surface staining that may be caused by underlying moisture damage.*
- Specialist: Consult experienced plaster restoration contractor.
- Testing: *Ensure physical and chemical compatibility between existing and new plaster.*
- In-kind Replacement: *All material replacement should match existing in both appearance and assembly. Veneer plaster should not replace 3-coat plaster on lathe. For large areas of new flat plaster walls and ceilings, control and expansion joints should be limited or concealed.*
Wood

Material Description
The interior finish woodwork of the State House is characteristic of the high level of craft associated with public buildings and places of government. The assemblies are primarily made from the hardwoods of broad-leaved flowering trees such as oak and mahogany, while examples of softwood usage are less common. Both painted and stained woodwork pre-dating the 20th century utilized premium heartwood from the harder, inactive core of a tree. The lumber was seasoned, dressed, and free of knots. Many installations may include old growth timber with closely-spaced grain, which was air-dried and preserved the wood’s natural resins and cell structures. Today, such qualities of wood are more often commercially unavailable or cost-prohibitive. Assemblies from later periods in the State House construction generally include kiln-dried lumber, and although likely constructed from premium grade stock, are more typical of contemporary wood supplies.

Assemblies & Locations
Many State House offices and chambers include decorative wall paneling, cornices, railings, wainscot, and baseboards. Decorative elements, particular within the Brigham Extension, include window, door, and fireplace surrounds with hand-carved details. Most
of the interior woodwork has a transparent finish, but in some cases it has been painted or stained.

Notable woodwork examples include the rusticated and painted wall treatment of the current Senate Chamber’s main (lower) level on the third floor, as designed by William Washburn in the 1860s, as well as the Senate Presidents Office (Room #332-12). The late-19th-century interiors of the Brigham Extension include wood-paneled office suites. The lower level of the House Chamber features wood treatment, while the upper level columns and pilasters are grain-painted plaster. The main staircases include mahogany hand rails.

Routine Maintenance

All cleaning regimens should be tailored to the existing finish of the wood assembly, i.e. whether the wood is natural, oiled, varnished, or painted.

Vertical wood surfaces will require less frequent cleaning than floors. Baseboards should be cleaned separately from floors; wall paneling and wainscots should be routinely dusted and wiped with a damp non-abrasive, natural cloth. If the surface is waxed or varnished, a suitable wax can be applied to vertical surfaces when needed to replenish the surface finish.

Finished wood floor surfaces should first be thoroughly dry mopped without the use of any detergent. Damp mopping is not recommended as a regular cleaning method for

Figure 27  Original wood wall paneling and added radiator enclosure in West offices of Brigham Extension.

Figure 28  Underside of spiral staircase with metal stringers and wood treads, balusters and railing. Stair is adjacent to Senate Chamber.
wood floors and should only be performed to remove soil accumulations or accidental spills. Mop heads should always be untreated and made of natural fibers to avoid floor discoloration. If clear water damp mopping does not satisfactorily remove dirt embedded in the finish, a neutral cleaner may be used with warm water, followed by rinsing with clean water. The floor should then be wiped with a dry mop.

**Restoration Treatment**

Historic wood assemblies and their finishes exist in varying degrees of condition, primarily due to typical damage from wear and tear. In some cases wood finishes have poor appearances due to overpainting, such as the wall rustication in the current Senate Chamber. Damage or deterioration is also the result of some underlying structural movement and water seepage.

When woodwork requires finish restoration, the use of hand-tool cleaning versus mechanical methods must be determined according to the specific sensitivity of each wood assembly or type. When possible, chemical removal methods should be avoided, but may be necessary to remove thoroughly-adhered coatings that effect other repairs.

When possible, woodwork should be repaired in place with retention of as much original material as possible. In cases of severe deterioration, woodwork may require repair by replacement or “Dutchman” splice repair. Repairs may also infill gaps, openings and voids left after removal of existing elements.

Wood replacement must be executed with clear, fine-grained solid lumber of species, cut and grade to match the existing member being repaired. The wood replacement should be kiln-dried to appropriate moisture content for fabrication. Replacement wood stock should be free of blue stain, knots, pitch pockets, and surface checks. Ultimately, repair and refinish procedures should maintain the existing form and material quality of each item.
Material Treatment  Wood

Primary Types/Species
- Oak
- Mahogany

Assemblies & Locations
- Wall panels
- Baseboards, chair rail molding, cornices
- Window casings, door casings
- Mantels
- Railings and balusters
- Floors

Problems of Repair
- Wear and tear, staining, abrasion
- Excess moisture or dryness
- Ultra-violet light damage
- Insect infestation
- Over-paint or varnish

Special Conditions
- Routine Maintenance: Specify cleaning procedures according to wood finish.
- Specialist: Consult experienced wood restoration contractor.
- Cleaning Mock-up: Test to determine appropriate cleaning solutions and wax treatments to avoid damage to wood finish or excessive residue.
- In-kind Replacement: Any work requiring material replacement should use same species and grade of wood.
- Sustainability: Some restoration processes may require the use of VOCs. Evaluate alternatives.
- Accessibility: Finishes and coatings must maintain required slip resistance on floors and ramps.
Ceramic Tile & Terrazzo

Material Description
With the advent of industrial manufacturing processes, ceramic mosaic floor tile was widely available in the United States after the turn of the 19th century. The material was (and remains today) a durable and long-lasting product, available in a wide range of colors for decorative use. Its modularity, in standardized units, also simplified application for floor spaces of varying size.

Following its introduction to America by European craftsmen in the late-18th century, terrazzo also experienced wide use in public buildings. In the State House, terrazzo flooring was manufactured on site from standard-sized marble aggregate cast within a cement matrix.

Most historic ceramic tile floors and terrazzo floors were not coated and simply acquired a natural "polish" or sheen through use. The surface of ceramic tiles is protected with a fired skin or glaze, and should not necessitate an additional protective coating. The same was expected of the terrazzo aggregate, which became highly polished during the floor's final grinding process during installation.

With the introduction of liquid-based waxes in the 1920s and their ease of application, many facility operators began the practice of routinely “waxing” their floors to create a

Figure 29 Mosaic marble flooring outside Memorial Hall (Hall of Flags) in the Brigham Extension.
Figure 30 Terrazzo with mosaic ceramic tile border on the 4th floor of the Brigham Extension.
shiny and suggestively hygienic appearance. Polymer-based finishes made their presence on the market in the 1950s, but later regulations against environmentally toxic ingredients eliminated their use in the 1990s.

**Assemblies & Locations**

Ceramic mosaic floor tiles were individually set by hand, as opposed to contemporary pre-mounted tile. This application resulted in a slightly irregular tile spacing, which today contributes to the floor’s historic character. The tiles were typically set and leveled in a layer of cement mortar over a bed of Portland cement and clean sharp sand. After the bed was hard, the joints were filled with pure cement mortar.

Terrazzo from this period was installed with a thick-set process also using Portland cement mortar. The terrazzo in the Brigham Extension is known as a monolithic or bonded installation, which had limited allowances for the control of cracking or movement within the floor structure. These areas of terrazzo, known as panels, each represent one pour, and are larger than contemporary construction practice. During this period, ceramic floor tiles were used as a dividing strip between the poured panels.

Notable examples of both flooring types exist in the 2nd, 3rd, and 4th-floor hallways of the Brigham Extension.

**Routine Maintenance**

Ceramic tile and terrazzo are relatively low-maintenance flooring materials. However, they both include porous materials that are susceptible to soiling and staining, especially in heavy traffic areas. Porosity is generally limited to the cement grout and binder.

On a weekly basis, both the ceramic tile and the terrazzo floors can be damp mopped with a neutral cleaner. The use of neutral cleaners is especially important to prevent chemical reactions with the existing flooring materials. Certain strengths of acids can deteriorate mortar, react with salts within the masonry system to produce efflorescence, or could damage the complex silicates in a glaze. All flooring should be pre-wetted to saturate the porous materials and prevent chemicals or other cleaning agents from deep penetration. Following the use of any cleaning solution, the floor should be thoroughly rinsed with clean water and dried.

Heavily soiled ceramic tile floors may be scrubbed with a natural bristle or nylon brush to loosen dirt from the surface. Abrasive cleaners (both powders and creams) and mechanical equipment can damage and wear away the protective surface and should not be used on
tile floors. Such methods may be allowable for terrazzo floors, but should be guided by a terrazzo specialist.

**Restoration Treatment**

Any restorative work on mosaic ceramic tile or terrazzo should begin with simple, non-abrasive cleaning to ensure that subsequent repair work is matched to the appearance of clean existing materials.

The durability of ceramic tile floors is dependent on the strength of the mortar bed and surrounding mortar joints. Weakened or deteriorated mortar allows tiles to settle, crack, or become loose. Damaged mortar should be carefully removed by hand. All mortar repairs should use a grout that matches the original as closely as possible for color and consistency.

In some cases, attempting to remove and replace one or more individual tiles can endanger surrounding tiles. Thus, it may be better to preserve and retain an original historic tile that is only slightly damaged, rather than replace it. Cracks and or separated tiles may be re-attached using an epoxy glue, or grout. Missing portions of tile may also be patched with an epoxy-mixed with colored enamel, or a mortar tinted to blend with the tile.

When an individual tile or a larger portion of an historic ceramic tile floor is missing or damaged beyond repair, it should be replaced. This damage may result from long term wear and abrasion or from settlement or vibration damage to the setting bed. Prior to initiating any repair, the source of any underlying problems must first be identified and corrected. The replacement installation may also require adjustment to the height of the setting bed to accommodate the thickness of available matching tiles, unless they are custom-produced.

Following a complete restoration of the mosaic ceramic tile or terrazzo floors, a properly applied and regularly cleaned floor coating can improve the stain resistance of the porous floor materials. The choice of coating depends on multiple issues which are best determined and applied by a qualified flooring restoration contractor. Ultimately, the use of either a water-based sealer or impregnator should **not** be permanent, create excessive gloss or shine, discolor or stain the original floor material, or damage the original floor material during periodic removal and re-application. Additionally, any coating selection must conform to the ADA accessibility guidelines which require a static coefficient of friction of 0.6 for level floor surfaces and 0.8 for ramps.
Material Treatment  Ceramic Tile & Terrazzo Flooring

Flooring Types
- Fired-clay mosaic tiles
- Portland cement terrazzo

Assemblies & Locations
- Thick-set installation
- Public corridor and lobby floors

Problems of Repair
- Wear and tear, staining, abrasion
- Settlement
- Cracking, spalling
- Mortar or grout loss
- Residual wax or sealant

Special Conditions
- Routine Maintenance: Specify cleaning procedures according to material type and finish. Insure that glazed finishes are not damaged.
- Specialist: Consult experienced ceramic and terrazzo restoration contractors.
- Cleaning Mock-up: Test to determine appropriate ratio of water to cleaner and exposure time of cleaner on surface.
- Testing: Insure physical and chemical compatibility between existing and new mortars.
- In-kind Replacement: The irregular spacing of hand set tile should be maintained. Anticipate complexity in matching new materials to existing ceramics and particularly terrazzo.
- Accessibility: Finishes and coatings must maintain required slip resistance on floors and ramps.
- Professional References: National Terrazzo & Mosaic Association (NTMA)
Brick & Terra cotta

Material Description

Beginning in the 1870s, the use of architectural brick and terra cotta grew in popularity following its introduction from Great Britain. Similar to ceramic tile, the materials were relatively inexpensive to produce, and available in a variety of forms and finishes.

The high-quality finish of brick used within State House interiors is commonly known as facing brick. Such bricks were made of special refined clays to produce unique colors and textures. The craftsmanship of these interior installations is also characterized by the use of bricks that are gauged, chipped, or rubbed to specific sizes and shapes. Many instances of decorative fireplaces within the Brigham wing include slender “Roman brick” which typically had nominal dimensions of 4” x 2” x 12”.

By definition, terra cotta is a hard-fired clay used for architectural facings, ornaments, and tile units. Depending on its period of fabrication, these elements were either hand-molded or machine-extruded. Similar to ceramic tile, most terra cotta building materials have been glaze fired, in addition to the initial bisque firing. Glaze is a layer or coating of a vitreous substance which has been fired to fuse to a ceramic object. Glazing is functionally important for building materials which would otherwise degrade through contact with water. In addition to their functional aspects, glazes also provide decorative color and surface features.

Figure 31  Fireplace hearth with Roman brick arch in office in Brigham Extension.

Figure 32  Bronze fireplace hearth constructed of Roman brick and marble demilune inlay in Brigham Extension.
Assemblies & Locations

Within the State House, decorative brickwork is primarily limited to use in the office fireplaces. However, the basement and sub-basement of the Brigham Extension exhibit extensive use of structural, facing clay tile in corridors and Guastavino ceiling vaults. Although originally considered a utilitarian feature, the hollow tiles survive as a unique historic feature.

Routine Maintenance

Interior architectural brick and terra cotta are relatively low-maintenance building materials. This is particularly true for glazed materials which were designed for easy cleaning. All assemblies however are subject to some degree of dirt accumulation and staining of their mortar or grout joints.

The cleaning of architectural terra cotta should remove excessive soil from the material surface without damaging the masonry unit itself. This can typically be achieved with water, a neutral detergent, and a natural or nylon bristle brush. The use of any acids may deteriorate mortar and react with the salts within the masonry system to cause efflorescence. All solutions should first be tested on a small, inconspicuous area and applied only to a thoroughly wetted material from which excess water has been removed. Pre-wetting the brick or terra cotta surface will saturate the porous materials and prevent chemicals or other cleaning agents from deep penetration.
Due to the fragility of some historic terra cotta glazes, physically abrasive cleaning techniques, such as high-pressure water cleaning, and the use of metal bristle brushes, must not be used. In addition to causing efflorescence, acids can also "burn" glazes. All of the above treatments can potentially weaken or destroy the glaze and subsequently expose the porous tile body to the damaging effects of water.

**Restoration Treatment**

Any restorative work on architectural brick or terra cotta should begin with simple, non-abrasive cleaning, utilizing neutral cleaners to ensure that subsequent repair work is matched to the appearance of clean existing materials.

Removing earlier repairs or instances of infill may be necessary when the work has either deteriorated or is visually incompatible. Any cementitious stucco, or inappropriate brick infill should be removed and properly rehabilitated. However, replacement of severely spalled, damaged, or missing architectural terra cotta and brick elements is potentially difficult due to:

- complexity of the interlocking system of masonry units, backfill, or anchoring system,
- limited commercial availability of in-kind materials, and
- difficulty in matching the appearance of original fired clay or glazing.

When replacement is necessary due to deterioration, all of the original deteriorated material should be completely removed. Half brick or similar partial cosmetic replacement techniques are not advised. Precast concrete units may be an acceptable replacement for some architectural terra cotta. Similarly cast materials, using molds based on surviving intact elements, can replicate historic details and be colored or tinted to match the original material with acceptable results.
Material Treatment  Brick & Terra cotta

Primary Types
- Gauged brickwork
- Roman and pressed brick
- Glazed block and tile
- Guastavino tile

Assemblies & Locations
- Fireplaces
- Brigham Extension basement and sub-basement walls and ceilings

Problems of Repair
- Wear and tear, staining, abrasion
- Cracking, spalling
- Mortar/grout loss
- Efflorescence

Special Conditions
- Routine Maintenance: Specify cleaning procedures according to material type and finish. Insure that glazed finishes are not damaged.
- Specialist: Consult experienced masonry restoration contractor
- Cleaning Mock-up: Test to determine appropriate ratio of water to cleaner and exposure time of cleaner on surface- preserve glaze
- Testing: Insure physical and chemical compatibility between existing and new mortars.
- In-kind replacement: Anticipate complexity in matching new materials to existing brick and terra cotta.
- Accessibility: Finishes and coatings must maintain required slip resistance on floors and ramps.
Stone

Material Description

The State House contains a wide variety of stone types used for interior finishes. Among the hard, crystalline metamorphic rock types there are examples of marble and slate. Among the igneous types, there is a prevalent use of granite. Marble and granite were historically valued for their exceptional hardness. In the oldest interiors of the State House, their appearance is characterized by a honed finish, while latter additions include polished finishes that were ground and buffed for a glass-like surface. The ceremonial spaces in the Brigham Extension included multiple distinct varieties of foreign marbles whose names signify their color/origin: Pavonazzo (White/Italian), Grande Antique (yellowish-ivory/French), Languedoc (red/French), Siena (yellow/Italy), and Verte Campagne (green/French).

Assemblies & Locations

Within the original Bullfinch State House, stone such as marble and slate was predominantly used for floors and stair treads. Within the Brigham Extension, stone was more extensively used for decorative interior wall paneling, wainscot, columns, cornices, stair railings and balusters, fireplace surrounds, and hearths. The elaborate 2nd–4th floor hallways of the extension have marble floors and wainscots. The Central Stair Hall, which

Figure 35  Siena marble columns and polychromatic marble flooring in Memorial Hall (Hall of Flags).

Figure 36  Pavonazzo and Siena marble flooring, stairs, balusters, and columns in the Senate Stair Hall (Nurses’ Hall).
also serves as the current House Lobby, includes a split run staircase. The 1st-4th floor hallways of the 20th-century East and West Wings have less ornate marble wainscots, baseboards, and doorway architraves.

**Routine Maintenance**

Stone is a very durable and low-maintenance flooring material. However, depending on its porosity, it can be susceptible to dirt accumulation and stains, especially in heavy traffic areas.

On a weekly basis, floors can be damp mopped with a neutral cleaner. The floors should be pre-wetted to saturate the porous materials and prevent chemicals or other cleaning agents from deep penetration. Following this, cleaners should remain on the floor surface for a suitable time to allow dissolution of soiling and grime. However, the cleaner should not be allowed to dry on the floor surface. The resulting dirt-laden solution should then be rinsed from the surface by squeegee, vacuum, or mopping, followed by additional rinsing with ample clean water. Following cleaning, the floor should be thoroughly rinsed with clean water and dried with terry cloth towels, if necessary.

Heavily soiled areas may be scrubbed with a natural bristle or nylon brush to loosen dirt from the surface. If possible, a stain should always be identified first in order to select the material best-suited to remove it. However, even a dilute bleach solution should not be left on the flooring for more than a few minutes, since the alkali in the bleach can lead to the formation of a white efflorescent deposit.

![Figure 37](image1.png) **Marble stair tread with typical surface wear in the Bullfinch Building.**

![Figure 38](image2.png) **Contemporary wheelchair ramp and wainscot to match existing in the West Wing.**
Restoration Treatment

Typical stone damage and deterioration includes missing units, missing grout, loose units, or excessive surface-wearing – such as stair treads.

When repairing stone in place, protection should be provided to prevent damage or deterioration of adjacent materials and finishes and all other building elements and systems caused by the potentially abrasive methods of stone floor cleaning and repair work.

Any restorative work on stone should begin with simple, non-abrasive cleaning to ensure that subsequent repair work is visibly matched to clean stone. Excessive wax build-up and residue on polished marble surfaces will require testing to determine the gentlest method for surface restoration. Following wax removal, the stone should be repolished before re-application of any protective finish.

Loose stone units should be carefully removed, relayed and re-grouted with new mortars or grouts to match cleaned, adjacent material. When repairing or replacing damaged units, as much original material as possible should be retained and replacement of historic material should be specified conservatively.

Wholesale removal of existing stone should be performed using hand methods only. Replacement stone must match the original’s size, color, veining, and finish surface texture. Setting and grouting materials must be physically compatible with existing and should match original color. Stone installation must also follow the original pattern and joint width.

For filling of cracks and adhering “Dutchman” splice repairs, epoxy resins may be used that are specifically formulated for stone-to-stone adhering. Seam widths should be minimized according to manufacturer’s recommendations and the face of stone should be protected from any staining due to overflow of the adhesive.
Material Treatment Stone

Primary Types
- Marble: Pavonazzo, *Grande Antique*, Languedoc, Siena, *Verte Campagne*
- Granite
- Slate

Assemblies & Locations
- Floors
- Walls, wainscot, door casings
- Stair newels and treads
- Fireplaces

Problems of Repair
- Wear and tear, staining, abrasion
- Residual wax/sealant
- Mortar/grout loss
- Cracking, spalling, settlement
- Efflorescence

Special Conditions
- Routine Maintenance: Specify cleaning procedures according to stone type and finish.
- Specialist: Consult experienced masonry restoration contractor.
- Cleaning Mock-up: Test to determine appropriate ratio of water to cleaner and exposure time of cleaner on surface.
- Testing: Insure physical and chemical compatibility between existing and new mortars.
- In-kind replacement: New stone should match existing in type, color, veining (if applicable), and finish.
- Accessibility: Finishes and coatings must maintain required slip resistance on floors and ramps.
Wall Coverings, Drapery, & Carpet

Material Description
The room décor of the late-18th and 19th centuries was greatly influenced by the installation of textiles, which included both woven fabrics and leathers. The design and specification of these features was often separate from the responsibilities of the architect and performed by fabric craftsmen, sometimes referred to as an “upholder” (root of the term upholstery).

The use of textiles in public buildings significantly grew in this period as industrial processes lowered the costs of what were previously hand-made wall and floor coverings. The U.S. carpet industry originated in the late-1700s, but the product was not generally affordable until the advent of industrial looms in the mid-19th century. After World War II, the original use of natural fibers (primarily cotton) in carpeting and other architectural textiles diminished with the introduction of manmade fibers such as polyester, nylon, rayon, and acrylics.

Assemblies & Locations
Due to the relative fragility of these materials, very few of the original wall coverings, drapery, or carpets, have survived in the State House. The historic documentation for

Figure 39  19th century patterned carpet and fabric wallcovering in the Senate President’s Office.

Figure 40  Patterned carpet in the House Chamber.
original installations is most complete for the Brigham Extension, which included extensive use of floor-to-floor carpet, window drapery and textile wall treatments.

**Routine Maintenance**

Textile preservation is dependent on regular maintenance routines. The woven and/or fibrous nature of textiles allows them to collect and hold soils and airborne dust particles. Although the slow rate of soiling may be unnoticeable to building users and facility managers, infrequent cleaning can reduce textile lifespan and lead to the bio-degradation of organic fibers. Vacuuming is effective for surface cleaning, but professional textile restoration treatments should be routinely performed to remove prolonged soil accumulation. In addition, historic textiles are highly sensitive to light damage and should be shielded from direct sunlight with shading devices or through ultra-violet light filtration.

**Restoration Treatment**

Depending on conditions, textile restoration may be performed onsite for anchored textiles, such as carpet, or performed offsite in controlled conditions for draperies and other detachable items.

The process of textile cleaning must first loosen soils and stains from the absorptive fibers before extracting them. The role of soil suspension is to loosen the bond that holds soils on the tips of the fibers. These bonds are the result of oils or other adhesives and may require some chemical action, in addition to water, to be dissolved.

Similar to the care labels of clothing, architectural textiles are sensitive to exposure to chemicals, temperature, water quality, and agitation during cleaning. All of these factors can lead to structural damage of the historic weaving, or risk the colorfastness of dyed threads and applied patterns. Therefore, all cleaning products and processes must first be tested on a small, inconspicuous area, and follow the general guidelines for use of neutral cleaners.

Once bound soils have been suspended, both those soils and the particulate soils must be removed. Extraction systems typically provide high-volumes of water to completely rinse soils from the textile. It should be noted, however, that high-pressure systems should not be used and can quickly damage historic textiles. Any enhanced drying of textiles following cleaning should rely on increased air movement versus heat. Mechanical drying, particularly during onsite carpet cleaning, reduces wicking and re-soiling, and the potential for mold growth.
Textiles which have been treated offsite during a comprehensive restoration project should not be reinstalled until spaces are enclosed and weather-tight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels.

Manufacturers currently produce a wide selection of antique designs that may be appropriate for new installation within the State House. Customized production of patterns according to historic documentation may be appropriate for high level historic spaces, and/or feasible for large installations.
Material Treatment  Wall Coverings, Drapery, & Carpet

Primary Types
- Textile wall coverings
- Drapery
- Broadloom and tufted carpet
- Flags

Assemblies & Locations
- Coolidge Room
- House Chamber flooring

Problems of Repair
- Soil and stain accumulation
- Abrasion from foot traffic
- Ultra-violet light damage

Special Conditions
- Routine Maintenance: Specify cleaning procedures according to textile type, weave, and colorfastness.
- Specialist: Consult experienced textile restoration contractor
- Cleaning Mock-up: Test to determine appropriate ratio of water to cleaner, exposure time of cleaner on surface, and process.
- In-kind replacement: Historic colors and patterns may be commercially available or possible through custom production.
Ornamental Metalwork

Material Description

The State House development periods can be distinguished by their particular use of ornamental metalwork. The late-18\textsuperscript{th}-century period was characterized by the decorative use of brass, defined as any of various alloys consisting essentially of copper and zinc. This light metal was used for door, window, and furniture hardware as well as chandeliers and sconces. Nineteenth-century developments of structural technology found expression in staircases and railings composed of cast iron (cast in a sand mold) and wrought iron (forged and welded) assemblies. Decorative elements from this period, such as doors and hardware, incorporated durable, cast bronze. One of the most unique and characteristic innovations from this era were the introduction of first gas and then electrical lighting fixtures. In public buildings of the period, these fixtures were often custom-designed by architects and cast in bronze. In most instances of bronze, the surfaces were lacquered.

Assemblies & Locations

Very little of the original late-18\textsuperscript{th}-century ornamental metalwork has survived in the Bullfinch structure. However, the notable spaces surviving from this era - current Governor's Office, current Senate Chamber, and current Senate Reception- all have chandeliers from 19\textsuperscript{th}-century renovations. The restoration of Doric Hall in the 1890s resulted in the installation of Colonial-inspired brass ceiling fixtures.

The period of the Brigham Extension construction represented the zenith of ornamental architectural metalwork in the United States. The iron staircases of the two stair halls
include ornamental soffits (Figure 43), stringer panels, newels and railing (Figure 41). Historically, the elements were not plated, though previous investigation (Ann Beha & Associates, 1985) has revealed original polychromatic paint finishes and applied metal leaf.

Within the Brigham offices, cast bronze was used for ornamental door handles and lock plates, in addition to metal radiator grilles. The vault room of the original Treasury Office Suite (#227-7) includes a unique bronze mantelpiece (Figure 46). The State Library retains unique sliding bronze doors at its entrance, original iron stairs and bookcases, as well as innovative glass floors. Structural steel was also ornamented in the Memorial Hall (Hall of Flags) which includes metal cove ceiling ribs.

The most notable items missing from the 19th-century period of construction are the original electric lighting fixtures, including hundreds of bronze chandeliers, sconces, and “standards” from the House Chamber, staircases, library, and corridors. According to historic records, the original designs replicated the appearance of gas fixtures known as gasoliers and included glass globes. Surviving pieces from this period exist in the current Senate Conference Room (circa 1897) and the Senate Chamber, reception room, and Governor’s office (pre-1867).

Within the 20th-century East and West Wings are installed solid bronze or brass mail chutes and letter boxes. The staircases have cast-iron railings that were not originally plated. The newel posts were originally finished with Belgian black marble ball finials,
though few remain. Some original classically-designed steel doors survive in hallways—though many have been replaced with wood replicas. Currently, throughout the public corridors and staircases, there are undated, non-historic installations of Colonial-inspired chandeliers and wall sconces.

Routine Maintenance

Routine maintenance treatments should be specific according to each type and finish of ornamental metal. Although metals are highly durable materials, the routine application of inappropriate treatments can severely damage polished finishes and patinas. The determination of in-house versus contracted metal maintenance should be determined according to availability of experienced personnel.

Dusting and occasional wiping with a damp, soft cloth will remove most common dirt and grime. If not performed regularly, however, accumulations of dust and dirt can tarnish metal surfaces or become hardened. Treatment of these conditions may require localized use of a soft natural brush, followed by appropriate polishing to restore the appropriate metal finish.

Corrosion is the primary risk for ornamental metal surfaces, particularly those assemblies near building entrances, restrooms, and food services. In these spaces, metals (especially bronze) should be monitored for any sudden outbreak of small patches of corrosion distinguished by rough, light green spots. Additionally, all metal surfaces should be monitored for cracking or peeling lacquer.

Figure 46 Bronze fireplace hearth constructed of Roman brick and marble demilune inlay in Brigham Extension.

Figure 47 Cast iron treads with wrought-iron railing in Brigham Extension.
Specific locations of tenacious mineral deposits or exudations of core material may require the use of neutral cleaners, or in severe cases, very fine metal abrasives. The use of abrasives should be limited to experienced metal restoration contractors due to risk of damaging the metal’s protective coating and patina.

**Restoration Treatment**

When possible, the repair of ornamental metalwork should be performed in place and should always attempt to retain as much original material as possible. Duplication and replacement of historic items should only be permitted for severely deteriorated features.

Types of finish deterioration are specific to their unique metallic properties. However, some changes in appearance to metallic surfaces are not harmful and in fact desirable. For example, a patina is a film or encrustation produced by oxidation on the surface of old bronze and copper and is typically preserved for its ornamental value.

Following the removal of deteriorated coatings and corrosion, metal surfaces should be refinished with high-quality approved finish coatings. The use of manual removal methods (scraping, wire brushing, or sanding) versus mechanical methods (hand power tools) must be determined according to the specific sensitivity of each metal assembly or type. When possible, chemical removal methods should be avoided but may be necessary to remove coatings which are more thoroughly adhered and are required to be removed to facilitate other repairs.

In cases of severe deterioration, metal assemblies may require repair by patching with filler metal, piecing-in, or splicing and reinforcement. Additional repair may include use of steel-based patching compound, or replacing missing or deteriorated elements with new pieces based on duplicates of existing, intact features. Newly exposed metals (particularly ferrous) must be primed within strictly allotted time limits to prevent corrosion and failure of new protective coatings or finish paint. Ultimately, all repair and refinish procedures should maintain the existing form and material quality of each item.
Material Treatment Ornamental Metalwork

Primary Types
- Cast-iron
- Wrought-iron
- Bronze
- Brass
- Painted or metallic leaf finish
- Lacquered finish

Assemblies & Locations
- Handrails and guardrails
- Light chandeliers, standards, and sconces
- Door and window hardware
- Ventilator grilles
- Mail chutes
- Pressed ceilings

Problems of Repair
- Wear and tear, staining, abrasion
- Corrosion
- Loss of gilding
- Inappropriate painting
- Lead-paint abatement

Special Conditions
- Routine Maintenance: Specify cleaning procedures according to textile type, weave, and colorfastness.
- Specialist: Consult experienced textile restoration contractor
- Cleaning Mock-up: Test to determine appropriate ratio of water to cleaner, exposure time of cleaner on surface, and process.
- In-kind replacement: New metal components should be custom fabricated and match existing in both type and finish.
- Insure galvanic and corrosion compatibility of composite assemblies.
Decorative Glass

Material Description
The earliest use of flat glass plates in the State House were created from rolled molten glass. Such glass had variable thicknesses and was limited in installation size. In the late-19th century, research and mechanical technology greatly advanced the production of glass for the building industry to allow for larger sizes of both flat glass plates and windows. Additionally, the strength of plates was improved through processes to control molten glass and maintain consistent plate widths.

America’s stained glass industry boomed during the second half of the 19th century, and the period of the Brigham Extension’s design and construction. Stained glass is specifically glass that has been coloured by adding metallic salts during its manufacture. The term "stained glass" has also been extended to include domestic leadlight and objets d'art created from lead came and copper foil glasswork. The glass is crafted into various architectural forms using small pieces of glass held together (traditionally) by strips of lead and supported by a rigid frame. As seen in Figure 50 and Figure 51, stained glass assemblies also include hand-painted panes to enhance the pictorial designs.
Assemblies & Locations

Lead and zinc came are the two most common assembly materials used in stained and other “leaded” glass. The strength and durability of the leaded panel assembly depends upon the type of came, the quality of the craftsmanship, and the glazing concept or design, as well as on the metallic composition of the came, their cross section strength, how well they are joined and soldered, and the leading pattern within each panel.

Within the State House, leaded and stained glass was originally used in windows, doors (including transoms and sidelights), domed-ceilings, and light fixtures. However, some of these installations, such as the House Chamber ceiling, have since been removed following periods of roof failure. Stained glass windows were also removed from the State Library. Notable surviving examples include the decorative and representational use of glass on the doorway to Senate suite (room #433-1) in the Brigham Extension. Because the designers of the Brigham Extension wanted to preserve the 3-level definition of the Bulfinch façade, the 4th floor was not expressed on the exterior, and therefore the rooms were illuminated by skylights, or in some cases small upper windows.

Routine Maintenance

Dirt, soot, and grime can build up on both sides of glass due to pollution, smoke, and oxidation. In particular, stained glass in the horizontal position readily collects dust and dirt over the years. These deposits can substantially reduce the transmitted light and make...
an originally bright window or skylight muted and dull. Routine cleaning will prevent the accumulation of this soiling, which can harden over time. The use of clean water and a soft cloth should be sufficient for most cleaning. A neutral cleaner may be used on heavier soiling. Acidic, caustic, or abrasive cleaners should never be used, including most common household glass cleaners which contain ammonia.

Painted glass, however, must never be cleaned before the stability of the paint is confirmed, and only then with great caution. Fragile paint requires the consultation of an experienced glass conservator.

Routine cleaning also insures the regular inspection of glass conditions. Minor cracks, sagging, and oxidation are typical of historic leaded glass, and may require no treatment. The guidelines for Restoration Treatment identify the conditions that suggest further investigation for repair.

**Restoration Treatment**

Although glass itself does not normally deteriorate, it is susceptible to scratching or etching by abrasion or chemicals, and to breakage. The greatest and most common threat to a leaded glass assembly is deterioration of the skeletal structure that holds the glass in place. The structure consists of frame members, and lead or zinc (occasionally brass or copper) came that secures individual pieces of glass.

In the State House, frame members include wood sash and muntins and steel t-bars and “saddle bars”. Wood frames may warp or deteriorate over time and steel elements may corrode. When frames fail, leaded glass sags and may crack due to insufficient bracing. In addition, glazing compounds decay over time from moisture and exposure to ultra-violet light. These conditions require repair to prevent the loosening of glass panes.

Although minor sagging and bulging is typical in historic windows, when bulges exceed 1½” out of plane, glass pieces can crack from severe sagging and pressure. When possible, the original assembly framing should be retained and restored. The strength of a leaded glass assembly is also dependent on bracing. Although bracing may be adequate, the tie-wires that attach the leaded panels to the primary frame may be broken or disconnected at the solder joints.

Came is prone to natural deterioration from weathering and from thermal expansion and contraction, which causes metal fatigue. The inherent strength of the assembly system is also related to the cross-section, profile and internal construction of the came. Came segments are connected with solder, which requires a high degree of skill. Solder joints
should be neat and contact the heart of the came—wherein lies its greatest strength. Large globs of solder commonly conceal came{s that do not meet.

Because leaded glass cannot be sufficiently weatherproofed in a horizontal (or arched) position, the laylights in the State House are all protected by skylights or “diffusers”—rooftop features that diffuse the natural daylight into the attic, and protect the glass ceilings and domes from the elements. Due to the inferior quality of glazing sealants of the late-19th and early 20th centuries, and to deferred maintenance, many of the State House glass ceilings have been removed or covered. In the cases where artificial lighting has been added to backlight ceiling or dome glass, alternatives should be investigated to restore the original natural illumination, whether through repair of the existing diffusers or their wholesale replacement by a contemporary skylight assembly.
Material Treatment Decorative Glass

Primary Types
- Flat glass plates (transparent)
- Stained glass
- Painted glass

Assemblies & Locations
- Wood and metal frame
- Lead came
- Windows and transoms
- Ceiling laylights and domes

Problems of Repair
- Scratching and etching
- Fragile paint
- Breakage
- Frame deterioration, bracing failure
- Glazing compound decay, came fatigue
- Poor soldering

Special Conditions
- Routine Maintenance: Specify cleaning procedures according to presence of painted glass and vertical vs. horizontal installation
- Specialist: Consult experienced glass conservator
- Cleaning Mock-up: Test to determine appropriate ratio of water to cleaner, exposure time of cleaner on surface, and process.
- In-kind replacement: Historic colors and patterns may be commercially available or possible for recreation.
- Monitor conditions frequently for frame deterioration or loosened glass.
- Where possible, restore natural lighting conditions for laylights and glass dome ceilings.
3 Interior Design Guidelines

Introduction

Section 3 addresses the typical elements of design that are required to accommodate the changing needs of building occupants over time. Although the State House is to be preserved as a historic landmark, the facility must continue to provide a comfortable and efficient work environment for its occupants. Future work in the State House requires careful calibration with the associated preservation levels of significance (discussed in Section 1) and the appropriate treatment of historic materials (discussed in Section 2).

This section will demonstrate:

- Goals of design for future State House Projects, particularly office spaces
- Methodology for spatial planning
- Coordinated approach to selection of partition and furnishing types
- Criteria for improvements to lighting, acoustics, and building systems
Interior Design Principles

The guidelines provided in this section seek to enable a healthy and efficient work environment for state operations and business, while safeguarding the historic State House for future generations. The prescribed criteria for materials, room treatments, furnishings, and building systems have been selected according to the principles of appropriateness and compatibility as described in Section 1. These principles are characterized as:

1. expressing and revealing historic features wherever extant and possible;
2. minimizing the visual impact of functional interventions, and using new and updated technologies (such as lighting) to highlight historic features when feasible;
3. refraining from imitative design interventions that obscure or blur the distinction with existing historic elements, or which are not appropriate to the period of historic significance;
4. designing new interventions to be at a level of architectural quality and durability appropriate to the existing surrounding construction;
5. designing new interventions to be clearly differentiated yet compatible with the historic features in material, size, scale, and proportion; and
6. executing new work in historic spaces in a manner which is reversible without damage to existing significant materials and features.
Space Planning Methodology

The following space planning methodology is intended for consistent application with all scales of interior improvement projects - whether a single office, a complete office suite, or an entire wing of multiple space types. The adoption of this process recognizes the potential long term damage and loss of architectural integrity that may result through the uncontrolled practice of ad-hoc repair and interior renovation. The following four sequential steps provide a framework for analyzing each project in terms of current program, building systems, and the host space’s relative historic significance.

Evaluate
Evaluation is a data gathering exercise to identify the existing conditions of the space and the user needs for improvement. A “Room Data Sheet” will be issued to the user group representative and used to compile this information, in coordination with appropriate facility staff. A scaled plan of the proposed work area should be referenced or developed. The space should also be inspected during normal business operations to document additional conditions not yet observed or recorded.

Plan
The planning phase must establish the criteria to guide the project design. The phase should first determine the significance level of the space(s) according to the State House Master Plan. Levels I-V specify conditions for the treatment and use of historic interiors and/or their associated materials. The significance level will determine the approach to any reconfiguration of historic interiors or alterations required for building code compliance. Beyond improving existing conditions, planning should also anticipate future spatial needs and operability before finalizing the user’s program and space requirements.

Recommend
This phase utilizes a prescriptive “Kit of Parts” to guide selections for project components including partition and door types, workstation configurations, furnishings, and storage. Selections should consider compatibility with historic
finishes, fixtures and features. This phase should consider a range of spatial configurations and design alternatives for implementation. In conclusion, a preferred alternative should be identified based on a full assessment of project opportunities and constraints.

**Review**

The review phase occurs prior to project procurement. The project review materials should document the prior three phases and outline the decisions leading to the preferred alternative. Minimal material specifications for each selected product type should also be presented. Project review verifies the appropriateness and compatibility of a space’s proposed treatment and use, while insuring the overall goals of the State House Master Plan.

**Room Data Sheet**

The Room Data Sheet has been created for the evaluation phase and is formatted specifically for the space planning needs of the State House. The concise 2-page template organizes data related to the physical characteristics of the space and the programmatic requirements of the users. The data sheet identifies the room’s Level of Significance and can highlight features and materials that require evaluation by a historic preservation professional. Any relevant room information not addressed in the data sheet format should be provided on supplemental pages.

*A blank version of the Room Data Sheet is provided in Appendix E.*

The data sheet enables the development of programmatic and square footage requirements during the planning phase. These requirements are generated according to existing and preferred conditions of occupancy, adjacency, privacy, lighting, technology, and storage.

When a State House user group initiates a new project, the Room Data Sheet will be provided by the Bureau of State Office Buildings (BSB) for collaborative development. The figures on the following pages provide an example of how to use the Data Sheet. In the example, an area that straddles the West Wing and the Brigham Annex offices has been chosen to evaluate and illustrate the use of room data in considerations of office planning.
Figure 54  Sample State House room data sheet, front.
Figure 55  Sample State House room data sheet, back.

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<td>Pedestal Stationary (F1)</td>
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<td>Trash Can (AS1)</td>
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<td>Humidity (Typical):</td>
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<td>Identify unique HVAC concerns:</td>
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<td>Identify any security/alarm requirements:</td>
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<td>HISTORIC PRESERVATION</td>
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<td>Please reference Historic Preservation reports for any issues related to this room.</td>
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<td>Identify additional details of historic elements within space (i.e. architectural moldings, paneling, doors etc.):</td>
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<td>ADDITIONAL COMMENTS</td>
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Criteria for Space Reconfiguration

The rehabilitation of many State House interiors will include the alteration or sub-division of existing spaces. Many of these conditions for reconfiguration can be standardized through the use of the “Kit of Parts” that follows this discussion. The determination of new space configurations, including the abutment of new partitions with partitions designated for preservation should be guided by the following criteria:

Partition Walls

The boundary walls of a rehabilitation project will generally correspond to the original partition walls of a State House space. Divisions required within the larger project space should be configured to limit the visual intrusion of new partitions.

The spacing and location of new partitions should harmonize with existing room features. Room bays are defined by the location of windows, doors, columns, pilasters, or ceiling beams. Coordination with existing bays is especially important for opaque partitions. Opaque partitions should complement the surface features and finish of existing historic partitions, while not mimicking their details or design. Typical elements are diagramed in

Figure 56 Diagram of typical partition relationships within a historic interior.
Figure 56. Partitions composed of transparent or translucent panels generally provide the least intrusive appearance for division of a historic interior. Their appearance can also be minimized by concealing their frames within adjacent walls and ceilings or specifying butt-joint glazing. Specification of glazed partitions must be coordinated with requirements for acoustic privacy and fire separation, also discussed in the Design Guidelines.

Ceilings

Historic decorative plaster ceilings and vaulted ceilings should be exposed where possible. When suspended ceilings are required to improve acoustic conditions and/or provide cavities for building systems, they should not extend fully to historic perimeter walls. New ceilings should not engage historic decorative molding at original transitions or window and door frames. In all cases where suspended ceiling elevations are lower than window extents, soffits should be installed to preserve or expose existing molding as shown in Figure 57. Margins of separation should also be provided at historic door casework.

Columns

Cast-iron and ornate plaster columns, which are present throughout the office zones of the Brigham Extension, have previously been obscured or engaged
within new partitions. These columns should be restored and treated as un-engaged and intact historic features within the spatial organization of office or circulation areas (Figure 58).

**Office Space Configuration**

Offices comprise the majority of State House space utilization and are subject to the most frequent cycles of modification. Office arrangements are characterized by two types of configuration – private and open. Depending on location within the State House, one type of configuration will be a more appropriate rehabilitation strategy than the other, given existing and historic conditions.

**Private Offices**

Private offices are intended to create a separate, private space for their occupants. For the purpose of these guidelines, a private office is any workspace intended for one or two people and equipped with a door that closes it off to surrounding spaces.

**Open Offices**

Open office areas contain multiple workstations and are intended to provide communal workspace. Well-designed open office areas also provide some level of separation among workers. The task of good open office design is to create balance between a sense of community on one hand and individual privacy on the other. For the purpose of these guidelines, an open office area is any workspace intended for two or more people and not separated from surrounding circulation spaces by a door.
**East and West Wings**

The East and West Wings (highlighted in the plan at right) were originally organized by central corridors serving individual perimeter offices of similar size. With the exception of the “Connectors” adjacent to the Bullfinch Block, most of the Wing areas have been reconfigured as a combination of open and closed office space. This type of alteration is achievable with the existing columnar structural bays and the shallow floor plates. However, the continued reliance on the Connectors for circulation between wings will not support their alteration to an open office scheme unless additional provisions are made for egress.

Figure 59 illustrates the primary criteria affecting spatial reconfiguration in the East and West Wings. To improve daylighting and maximize user views to the exterior, the optimum placement of new vertical partitions is defined by the ratio 2.5H, where H is the room window height. Achieving this ratio will be constrained by needs for circulation near the column lines currently defined by the corridor walls. The depth of the column bays, defined by lines EW-J and EW-I, cannot accommodate inner office circulation if the existing corridors are retained, as in the Connectors.

To preserve the casework of historic windows, doors, and other decorative features, the extent of a suspended ceiling should be restricted by a margin which preserves those architectural elements intact and unengaged. These margins are illustrated in section to be 2'-8” from perimeter window jambs, and either 0'-6” above the outer edge of door frames or 2'-0” from the edge of historic partition walls.
Figure 59 Criteria for reconfiguration of East and West Wing.
**Brigham Extension**

The Brigham Extension constitutes more than half of the gross floor area of the State House and includes the largest areas of office space. The irregularity of the extension’s floor plan results in a variety of office zone arrangements mostly influenced by the building depth, i.e. distance from the building perimeter to the central circulation zone. The structure at this perimeter zone is an irregular sequence of bearing walls defining square and rectangular office suites. The reconfiguration of these spaces for open office arrangements is impeded by the narrow spacing of structural bays and the presence of office support spaces along the corridors.

The zones highlighted in the top plan at right indicate the deepest office suites and the areas which will cause the greatest challenge to extending daylighting and improving sightlines to the exterior. The zones highlighted in the bottom plan at right indicate the office suites having a fairly regular depth of approximately 30'-0".

Figure 60 illustrates the primary criteria affecting spatial reconfiguration in the Brigham Extension. Implementing the 2.5H ratio to improve daylighting sightlines will be more difficult in these areas.

The depth of the column bays, defined by lines EW-J and EW-I, cannot accommodate inner office circulation if the existing corridors are retained, as in the Connectors.
To preserve the casework of historic windows, doors, and other decorative features, the extent of a suspended ceiling should be restricted by the same margins indicated for the East and West wings: 2'-8" from perimeter window jambs, and either 0'-6" above the outer edge of door frames or 2'-0" from the edge of historic partition walls.

Figure 60  Criteria for reconfiguration of Brigham Extension.
Conference, Meeting, and Hearing Room Configuration

Conference and meeting rooms, whether executive or staff level, should be sized for the assumed maximum number of attendees. Rooms are typically proportioned in a 2:1 ratio for adequate space of rectangular or oval tables. Hearing rooms should also be sized for the maximum number of attendees, including that of the audience and staff. The focus of this room is directional towards the proceedings with an audience behind. The main entrance/exit of the room should be opposite the directional focus of the room to minimize disturbances. Figure 61 demonstrates a variety of procedural layouts possible with flexible furnishings to accommodate approximately 70 audience members.

Figure 61  Hearing Room flexible seating configurations.
Designing with a “Kit of Parts”

The approach to new office design is based on the adoption of a Kit of Parts. This kit includes specific product types, characteristics and recommended finishes for the components. The product coding coordinates directly with selections from the Room Data Sheet for consistency and ease of identification. Several recommended manufacturers are listed for each product type. These may be used to guide the collection of additional product information, as needed.

Much of the basic interior partition and millwork scope can be fabricated on site in the State House workshops. Alternatively they can also be chosen from products available at the time the work is performed (see Section 4 for procurement information). Criteria for specifications and lists of recommended manufacturers are provided at the end of each component description. The Kit of Parts” consists of:

1. Partitions
2. Doors
3. Furnishings
   a. Desk Systems/Workstations
   b. Conference Tables
   c. Seating
   d. Storage

Specification guidance for all ‘Kit of Parts’ elements is provided in Appendix I.
Partitions

Whether undertaking a full office suite renovation project or constructing a single partition between adjacent office types, the partition type chosen affects many qualities of the overall office environment such as varying degrees of visual and acoustical privacy, shared artificial or day lighting, as well as efficient and better working environments for users.

Critical Design Issues

• Coordinate new ceiling heights with existing doors and windows.
• Coordinate new spatial divisions with existing window bays or column grids.
• Coordinate pathways for electrical, telephone, and data to minimize cutting and patching of historic materials.
• Provide adequate acoustic separations.

H - Historic Wall

Primarily used to identify and describe an existing historic partition and its elements (i.e. crown molding, chair rail, wainscot panels and base/shoe moldings). Also recommended to describe new partition needed to match or adjoin historic adjacent conditions (see discussion of Rehabilitation Strategies in Section 1 for design approaches).
A - Full Solid Panel

Recommended for separations between departmental office suites, or where fire separations are required. Also recommended for all storage areas, supply closets and mechanical/electrical closets. This partition type provides absolute visual privacy, no shared day lighting and can provide the most acoustic privacy. It is not recommended for use as private offices within open office suites or where offices occupy exterior window walls adjacent to open office space, which could benefit from shared day lighting.

B - Solid Panel + Transom

Recommended for private offices within an office suite, all private offices at exterior window walls, internal plan offices that could benefit from shared artificial or day lighting. It provides visual privacy while providing low levels of borrowed artificial and/or daylighting from adjacent spaces. A high level of acoustical privacy can still be provided using this partition type.
C - Solid Panel + Glass Wainscot

Recommended for supervisory type offices, department/offices open to public visitors, conference/meeting rooms or where visual transparency is required. This partition type provides visual privacy below waist and desk heights (30"-36") with transparent glass above. It provides for high levels of borrowed artificial and/or day lighting and can still provide minimum levels of acoustic privacy. Window treatments, such as blinds or curtains, are discouraged with this partition type because they defeat the intent of a visually-open office environment. The wainscot panel allows for storage or workstations to be installed flush to the partition on either side.

D - Full Glass Panel

Recommend for high traffic department entrances open to the public, office reception areas accessed by large numbers of State House staff, anywhere where secure access or separations are required. Minimal acoustic separations can be provided. Furnishing should be minimal, if none, and kept away from partitions. This type allows for maximum levels of borrowed artificial and/or day lighting. Window treatments, such as blinds or curtains, are discouraged with this partition type because they defeat the intent of a visually-open office environment.
E - Glass Wainscot + Glass Panel

Primarily recommend as an alternate to type C and D, where full transparency and no visual privacy are required. Recommended for areas with furnishing, such as meeting and conference rooms as well as waiting areas. The chair rail at wainscot height (30”-36”) allows for protection from furniture and user damage. As in types C and D, window treatments are discouraged.

F - Glass Wainscot + Glass Panel + Transom

Primarily recommended as an alternate to types D and E where the partition needs to include doors, whether single or double, within the wall type. The transom line above 7’-0” allows for a typical commercial height door to be inserted with its header and the wall to continue its geometry.
Doors

Door types and their selection are similar to that of partitions. Overall quality of the office environment needs to be considered with user requests for visual and acoustic privacy as well as shared artificial and day lighting. It is important that door types associated with similar spaces be of the same type within an office suite for visual consistency. Entry doors, storage closets or those of the senior level member may be distinguished by use of a different type within a suite.

Critical Design Issues

- Coordinate door hardware with security and accessibility requirements.
- Coordinate door hardware finish with original material palette.
- Insure appropriate acoustic separations at door framing.

D8 - Historic Door

Primarily used to identify and describe an existing historic door and it's detailing (i.e. frame and panels, moldings and hardware). Also recommended to describe the requirement for a new door needed to match or mimic the historic nature of adjacent conditions. Reference Historic Preservation guidelines for more information.
D1 - Solid Wood
Primarily recommended for most storage areas, supply closets and mechanical/electrical closets or where fire separations are required in areas. Also can be used in circumstances where absolute visual privacy is required. It is not recommended for use as private office doors within open office suites or where offices occupy exterior window walls, which could benefit from shared day lighting.

D2 - Wood + Transom
Primarily recommended as an alternate for D1 where higher ceilings allow for the added benefit of the transom for shared artificial or day lighting.

D3 - Wood + Glass Lite
Primarily recommended for private offices in office suites, all private offices at exterior window walls and internal plan offices where visual privacy is not required. This provides the added benefit of shared artificial or day lighting as well as transparency.
D4 - Wood + Glass Lite + Transom

Primarily recommended as an alternate to D3 where higher ceiling heights allow for the added benefit of the transom for additional shared artificial or day lighting.

D5 - Glass

Primarily recommended for high traffic entrances, department/office reception entrances open to public visitors, conference/meeting rooms or where visual transparency is required. This partition type provides full visual transparency.

D6 - Glass + Transom

Primarily recommended as an alternate to D5 where higher ceiling heights allow for the added benefit of the transom for additional shared artificial or day lighting.
D7 - Hollow Core Metal

Primarily recommended as an alternate to D1 where the additional cost of a wood door is not necessary. Typical use should be in service and maintenance areas as well as mechanical and electrical suites.
Furnishings

Design Process
Office improvement projects will be planned for open or private configurations. Options for desking, chairs, and storage are distinguished according to their applicability for either configuration. Private offices have the option of workstation or freestanding furniture as dictated by the user. Executive level offices should have formal accommodations of freestanding furniture. Lounge furniture and tables may be added as required by the user.

Furnishings for conference rooms include the conference table and perimeter seating for attendees. Optional furnishings can include stacking guest chairs at the room’s perimeter for additional attendees, a side table or credenza for storage, and lounge seating as space and needs require. For hearing rooms, conference tables and chairs are required to accommodate hearing officials, as well as additional tables and chairs for hearing participants and participating staff of record. Hearing room audiences should be accommodated in stackable guest chairs in rows spaced no less than 42”, measured from seat back to seat back. For both room types, table sizes must be determined based on the maximum number of participants seated only on one side of tables, facing each other. Reference the diagrams in Figure 61 for typical room layouts.

Both types of meeting rooms will require additional equipment, such as a wall-mounted or portable presentation boards and items to serve

Critical Design Issues
- Coordinate new wood species and finish with original material palette.
- Maintain constant elevation of work surfaces for visual consistency.
- Maintain line of sight with exterior windows when locating opaque partitions or overhead storage.
- Coordinate pathways for electrical, telephone, and data to minimize cutting and patching of historic materials.
audio/visual equipment, which are not specified in the Design Guidelines.

**Furniture Selection**

In all installations, considerations such as durability, comfort, versatility, ergonomics, warranty and availability of replacement parts should be made when selecting a product manufacturer.

Beyond coordinating furniture for different spatial configurations, the design process also requires the determination of an appropriate and compatible style. The majority of office and conference rooms are designated Significance Levels II-V. Therefore, the selection of either antiques or historic replicas to match period style interiors will be very rare among typical office improvement projects. Instead, the majority of projects will specify new furnishings based on either "traditional" or "transitional" styles.

Traditional furniture styles are based on historic European and American designs from the 17th to 19th centuries and convey a formal appearance. They are characterized by the use of dark woods, heavy massing, and intricate details including carving, ornamentation, and representational patterns. The surviving historic interior details of offices and meeting rooms within the Bullfinch Building and the Brigham Extension are appropriate for the selection of traditional furnishings.

In the Design Guidelines, the transitional style is characterized by a more contemporary approach to design influenced by functionality. The utilization and expression of materials in this style
of furniture extends beyond wood to include metals and plastics. Assemblies are slimmer in profile, mostly eliminate ornamentation or compositional molding, and tend to feature geometric patterns. Given the simplicity and lack of decorative detail within the original East and West Wing office interiors, the transitional style is an appropriate selection.
WS1 - Executive Workstation

The WS1 is recommended for private executive or director-level offices. The configuration is a wood veneered U-shaped workstation made up of 4 system pieces: a desk, a bridge return, rear credenza and overhead storage. Large amounts of personal filing and drawer storage are provided in both the desk, credenza and storage units. As required, this option could be used for locations of historic significance where wood furniture is appropriate.

WS2 - Executive Desk

The WS2 is recommended for private executive or director-level offices where freestanding furniture is desired. The configuration is a freestanding wood veneered desk with a freestanding personal credenza. Sufficient personal filing and drawer storage are provided in both the desk and credenza units. As required, this option could be used for locations of historic significance where wood furniture is appropriate. One Executive Ergonomic task chair C1 and two Guest Chairs C3 are recommended.
WS3 - Office Workstation

The WS3 is recommended for private offices at the staff level. The configuration is a laminate U-shaped workstation made of 4 system pieces: a desk, a bridge return, rear credenza and overhead storage. Generous personal filing and drawer storage are provided in both the desk, credenza and storage units. One Office Ergonomic task chair C2 and two Guest Chairs C3 are recommended.

WS4 - Staff Workstation

The WS4 is recommended for open plan workstations at the staff level. The configuration is a laminate L-shaped workstation made up of 3 system pieces: a desk, a return and a mobile storage pedestal. Sufficient personal filing and drawer storage are provided in the mobile pedestal. One Office Ergonomic task chair C2 is recommended.

WS5 - Staff Workstation

The WS5 is recommended for open plan workstations at the staff level. The configuration is a laminate L-shaped workstation made up of 3 system pieces: a desk, a return and a mobile storage pedestal. Basic personal filing and drawer storage are provided in the mobile pedestal. One Office Ergonomic task chair C2 is recommended.

WS6 - Office Desk

The WS6 is recommended for private staff level offices where freestanding furniture is desired. The configuration is a freestanding laminate desk with a mobile storage pedestal. Basic personal filing and drawer storage are provided in the mobile pedestal. One Office Ergonomic task chair C2 and two Guest Chairs C3 are recommended.
WS7 - Office Desk

The WS7 is recommended as an alternate to WS6, where no personal filing or storage is required. The configuration is simply a freestanding laminate desk. One Office Ergonomic task chair C2 is recommended.

WS8 - Reception Workstation

The WS8 is recommended for an office suite reception area. The configuration is a laminate L-shaped workstation made up of 4 system pieces: a desk, a return, a mobile storage pedestal and a laminate transaction counter. Basic personal filing and drawer storage are provided in the mobile pedestal. One Office Ergonomic task chair C2 is recommended.

WS9 - Reception Desk

The WS9 is recommended for a public access point or way finding reception area. The configuration is a laminate freestanding desk with a laminate transaction counter and a mobile storage pedestal. Basic personal filing and drawer storage are provided in the mobile pedestal. One Office Ergonomic task chair C2 is recommended.
T1 - Executive Conference Table

The T1 is recommended for executive and director-level office areas used for conference, meeting and hearings. The type is a freestanding wood veneered top table with minimum two-pedestal wood veneered or metal pedestal leg bases. It is recommended that power and data is a built-in feature. Typical table widths are 36” to 48” and come in many lengths. A 6 foot long table should seat 6 people comfortably, an 8 foot long table for 8 people, a 10 foot long table for 10 people and so on. As required, this type could be used for locations of historic significance where wood furniture is appropriate. Executive Conference task chairs (C4) are recommended for use with the T1 conference tables.

T2 - Office Conference Table

The T2 is recommended for staff level offices and public-use areas used for conference and meetings. The type is a freestanding laminate top table with minimum two-pedestal metal or laminate pedestal leg bases. Power and data are optional features, but may be built in if required. Typical table widths are 36” to 48” and come in many lengths. A 6 foot long table should seat 6 people comfortably, an 8 foot table for 8 people, a 10 foot table for 10 people etc. Conference Office task chairs (C5) are recommended for use with the T2 tables.
C1 - Executive Ergonomic

The C1 is recommended for private executive or director-level offices. The chair should be a fully adjustable ergonomic office chair upholstered in leather or a leather alternative. The chair should be built from aluminum, steel and/or plastic, and include: a 5-leg star base with casters, adjustable headrest, dual adjustable armrests, recline action, seat depth adjustment and adjustable seat height cylinder. This chair is recommended for ordering with workstations WS1 and WS2.

C2 - Office Ergonomic

The C2 is recommended for staff-level private or open plan workstations. The chair should be a fully adjustable ergonomic office chair upholstered in a durable contract-grade fabric or mesh. The chair should be built from aluminum, steel and/or plastic, and include: a 5-leg star base with casters, dual adjustable armrests, recline action, seat depth adjustment and adjustable seat height cylinder. This chair is recommended for ordering with workstations WS3, WS4, WS5, WS6, WS7, WS8 and WS9.

C3 - Guest Chair

The C3 is an upholstered guest chair for all private offices or where required in open office plans. The chair should have a contoured seat and back, armrests, and plastic chair glides. The frame should be minimally constructed of wood, aluminum and/or steel. The seat and back should be fully upholstered in a durable contract-grade fabric or mesh. Upholstery in leather or leather alternative is optional, based on location in a WS1 or WS2 environment. Sled base guest chairs are not recommended. This chair is recommended for ordering with workstations WS1, WS2, WS3 and WS6.
C4 - Conference Executive

The C4 is recommended for private executive or director-level conference, meeting or hearing rooms. The chair is similar to the C1 description, excluding any optional ergonomic upgrades, as these are not intended for long-term seating use. The C4 is recommended for ordering with T1 conference tables.

C5 - Conference Office

The C5 is recommended for office and staff level and public-use areas conference or meeting rooms. The chair is similar to the C2 description, excluding any optional ergonomic upgrades, as these are not intended for long-term seating use. The C5 is recommended for ordering with T2 conference tables.

C6 - Folding/Stacking Chair

The C6 is recommended for all multi-purpose rooms, flex spaces and break rooms used by general staff or open to public audiences. The chair should be a stationary armless four-leg or sled base chair with contoured seat and back and plastic chair glides. The chair frame should be minimally constructed of an aluminum and/or steel frame. The seat and back should be constructed of metal or polypropylene. Chairs should be easily stacked or nested in minimum sets of 10.
C7 - Lounge Chair

The C7 is recommended for private executive, director-level or formal reception areas. The chair should be an oversized fully upholstered lounge chair of contract furniture construction standards. It should be constructed minimally of a metal or kiln dried wood frame and upholstered in a durable contract grade fabric, leather or leather alternative.
**F1 - Pedestal Stationary**

The F1 is a stationary pedestal file that is included with many of the workstation designations. It can hold several different storage drawer and/or file configurations. It offers minimal personal filing.

**F2 - Pedestal Mobile**

The F2 is a mobile pedestal file with a caster wheel base. It is included with many of the workstation designations. It can hold several different storage drawer and/or file configurations. It offers minimal personal filing.

**F3 - Vertical File - 2 Drawers**

The F3 is a stationary 2-drawer vertical paper storage file. Vertical files provide the most efficient approach to maximum storage capacity with a minimal footprint. Overall height is typically 29” from the floor.

**F4 - Vertical File**

The F4 is a stationary 4-drawer vertical paper storage file. Vertical files provide the most efficient approach to maximum storage capacity with a minimal footprint. Overall height is typically 52” from the floor.

**F5 - Lateral File**

The F5 is a stationary lateral 2-drawer paper storage file. Lateral files are ideal for long-term centralized office archival and storage. Overall height is typically 28” from the floor.

**F6 - Lateral File**

The F6 is a stationary lateral 4-drawer paper storage file. Lateral files are ideal for long-term centralized office archival and storage. Overall height is typically 52” from the floor.
S1 - Low Standard

The S1 is a stationary standard storage cabinet. Storage cabinets are ideal for essential supply and equipment storage. Cabinet doors are solid and include a locking device. Height allows for counter above. Multiples can be ganged for additional storage. Overall height is typically 29" from the floor.

S2 - Low Bookcase

The S2 is a stationary open face bookcase with one adjustable shelf. Height allows for counter above. Multiples can be ganged for additional storage. Overall height is typically 29" from the floor.

S3 - High Standard

The S3 is a stationary standard storage cabinet. Storage cabinets are ideal for essential supply and equipment storage. Cabinet doors are solid and include a locking device. Multiples can be ganged for additional storage. Overall height is typically 42" from the floor.

S4 - High Bookcase

The S4 is a stationary open face bookcase with three adjustable shelves. Multiples can be ganged for additional storage. Overall height is typically 42" from the floor.

S5 - Wardrobe Cabinet

The S5 is a stationary standard storage cabinet modified in height to allow for coat storage and taller items. Wardrobe cabinets are ideal for office suites that don’t have access to larger built-in storage closets. Overall height is typically 72" from the floor.
Interior Lighting

Design Process
As with other improvements, lighting design for the State House requires coordination with priorities for interior preservation. Current standards for illumination levels are significantly higher than those provided in the original building design or its subsequent additions and alterations. When seeking to increase illumination levels in a historic space, design solutions must balance improvements with the character-defining architectural features and the presence of any historic lighting fixtures. Higher lighting levels can be achieved by the careful and creative employment of new light sources, whether or not they are integrated into existing fixtures or into suitable features of the interior architecture.

Meeting energy codes will be of equal importance. Current energy legislation and developments in efficient technologies should be consulted at the beginning of any rehabilitation project. Potential operating cost-savings from energy efficient products should be identified and considered for all proposed lighting designs.

Historic Room Finishes
The surface finishes in a space have a direct impact on lighting design. Because of their high reflectivity, light or pastel colors dramatically improve the efficiency of a lighting scheme and support energy-efficient solutions because they reflect more light. However, many State House interiors originally employed dark colors for dramatic effect, particularly the 19th-century décor of the Brigham Extension. Designers must take the specific finishes of a room into consideration when estimating the performance of a lighting design for that room.

Daylight and Borrowed Light
Historically, natural light was the principle means of illuminating the State House offices and chambers. Although interiors were supplemented with various types of lighting fixtures, architectural features such as large windows, high ceilings, light wells, and glazed doors and transoms maximized the duration and reach of available sunlight. Notably, the original designers of the Brigham Extension wanted to preserve the exterior floor level definition of the Bulfinch building. The 4th floor is therefore not expressed on the exterior and the rooms are illuminated by skylights, or in some cases small upper windows.
Selecting Lighting Solutions

Lighting solutions must first determine the appropriate lighting levels for a space according to its use. Target lighting levels are measured in foot candle units which quantify the intensity of light falling on a surface, equal to one lumen per square foot. Horizontal foot candles (HFC) represent the intensity perpendicular to a horizontal surface and vertical foot candles (VFC) represent the intensity on vertical surfaces.

After determination of these target levels, lighting solutions should separately evaluate the following four elements:

Application
The intended purpose of the fixture will determine which qualities should be prioritized. A task light in an office should be chosen mainly for its efficiency and light distribution while a decorative sconce should be chosen for its shape, materials, finishes, light distribution, and ability to integrate efficient light sources.

Luminaire
Luminaire refers to the housing or fixture which holds a light source. Luminaire selection must be coordinated with the overall aesthetic concerns of an interior space. For example,
if the design goal is to highlight a work of art, an accent fixture with a narrow light distribution would be appropriate. If the art is in a historic area, a recessed fixture in the ceiling or in another unobtrusive location can be appropriate.

**Light Source**

Efficiency ratings will determine many light source selections. However, these decisions must be balanced against maintenance concerns. For example, although a linear fluorescent lamp is currently more efficient than an LED strip, the LED source may be a better choice for locations that will be difficult to access because LEDs need to be replaced far less often than fluorescent lamps. Beyond efficiency, the presence of artwork or other sensitive materials must also be factored when choosing light sources. When such features are present, museum lighting specialists should be consulted for more specific recommendations.

**Ballast/Driver**

Certain lamps will perform better, and have longer warranty periods, when matched with specific ballasts. It is very important to research the latest developments in lamp and ballast technologies to optimize a system by matching the components carefully.

Sources to be considered are listed in Table 1. Due to their high energy consumption and limited life-span, halogen and incandescent sources should generally not be used unless a thorough analysis of the application and available technologies concludes that there is no other option. In the cases where these sources are used, dimming should be employed to both extend lamp life and allow for flexible lighting levels based on variable factors such as daylight or occupancy.

To simplify maintenance, the number of different lamp types should be minimized throughout the State House. This will reduce the necessary inventory of spare lamps and
also help to ensure correct re-lamping of luminaires by the maintenance staff throughout the life of the fixture. In spaces where fixtures are difficult to access, extremely long lamp-life sources should be considered to reduce the associated costs of replacement and cyclical maintenance.

Many of today’s light source choices are actually part of a system comprised of the light source and a ballast or driver. These components form an integral part of the system and specifying them requires the same level of consideration as the light source itself. Electronic ballasts are now available for most fluorescent and metal halide light sources, and should be used as they provide improved efficiency, life, and color maintenance. Ballasts for fluorescent sources can also provide additional choices for saving energy, either through continuous dimming, bi-level dimming, or lower power ballast factors.

**Fixture Selection**

The character of State House interiors has evolved over time as lighting technology has advanced. In some instances, fixtures original to the room design have survived, in other space they have been replaced. In spaces of Level I and Level II significance, further research may be conducted to determine original or historically-appropriate light fixtures. Replicas of candle, gas, and early electric designs are possible using contemporary electric illumination. They may be commercially available or custom produced.

In spaces where the original quantity or location of historic fixtures cannot achieve recommended light level targets, the space should be further evaluated for supplemental lighting alternatives. In addition to installing more fixtures, a potential solution may also supplement replica fixtures with discrete downlights or uplights. In areas of Level I or II significance, supplemental lighting should be concealed when possible. Effective glare control is essential to keeping fixtures inconspicuous; therefore, fixture placement should be chosen to minimize glare. Louvers and snoots may also be used to control glare where it cannot be avoided.

In most instances, historic laylights and stained-glass windows have been sealed or blocked due to roofing failures or because of building additions. Where feasible, these features should be uncovered and restored following the repair and/or restoration of any problems that contributed to the abandonment of the feature.

In less significant areas, unobtrusive fixtures should be chosen to blend harmoniously with the proportions and shapes of the surrounding architecture. When exposed in these spaces, historic replicas should not be chosen without evidence of original installation.
Daylight Sensors
reduce electric light loads when sufficient daylight is present

Occupancy Sensors
turn off lights when no one is in the space

Astronomic Time Clocks
trigger a space to change from its 'day' scene to 'night' scene

Dimming Controls
allow for fine-tuning the level of light that is needed

Personal Controls
allow workers to control their environment, while restricting the design light level/energy load

Instead, fixtures should be chosen for their superior performance, energy efficiency, and maintenance-friendly design. But, as previously stated, these fixtures must be carefully chosen to enhance rather than detract from the surrounding architecture through their intrinsic form, material, illumination pattern, and placement.

**Lighting Controls**

Lighting controls are an essential part of any lighting design, and can significantly increase the energy efficiency of a design by reducing the actual energy usage as measured in Kilo-Watt-Hours (KWH). Daylight sensing controls that lower electric light levels based on available daylight should be integrated into atria to promote energy savings. These controls may be either dimmable or switchable. Properly calibrated switchable daylight zones should not change more than a few times each day, minimizing the number of people who would be distracted by this automated zone switching.

Over time, the efficiency of available lighting technology will improve and the relevant energy codes will tighten; however, the following guidelines for energy allowances are recommended as of this writing to conform to the Massachusetts State Building Code. The power for lighting registered interior historic landmarks is exempted from inclusion in power allowance calculations. All power allowances given here include a base
allowance by space type, as well as an additional allowance of 1.0 W/SF which is available if separately switched decorative, artwork or exhibit lighting is included in the design.

**Office Space Lighting**

The lighting in office spaces must support specific tasks performed by the occupants. Computer-based tasks favor specific direct and indirect methods of general lighting in order to avoid glare, both to the eye and on computer monitors. Glare can result in eyestrain, worker discomfort, and lowered productivity. Using a layered task-ambient illumination approach for an office space can result in significant energy savings. By limiting higher light levels to only those areas where they are needed, the remainder of a space can be illuminated at a much lower light level.

In office spaces that fall into the Level III, IV, and V categories of significance, fixtures should be chosen for their performance and efficiency rather than period style; however, fixture design and appearance must exist harmoniously within the proportions, shapes, and character of the architecture. Regardless of the significance level of an area, color temperatures and fixture styles must be consistent within each office suite.

To maximize energy efficiency, all offices should employ occupancy sensors to switch off or dim fixtures when the space is not in use. Perimeter offices should use daylight sensing controls that lower electric light levels based on available daylight. Depending on daylight penetration, fixtures within 15 feet of exterior windows should be controlled separately from other interior fixtures so that they may be dimmed proportionately to the amount of daylight falling in each part of the room. Without such electronic controls, daylighting does not provide any energy savings.

For conference rooms, the lighting systems should allow for a variety of uses. Meeting and note-taking require horizontal illumination at work surfaces. Rooms with flexible furniture arrangements will require 30 HFC for all possible work surface locations. Writing on whiteboards and blackboards requires vertical illumination of the surface achieving 5 VFC and 50 VFC, respectively. Video capture for tele-conference or recording requires even illumination of faces and surfaces to avoid unwanted shadows. Video/slide presentations require proper controls to adjust light levels. The locations of projectors and lighting fixtures must be coordinated to avoid interfering with the projection cone. Controls should be simple and intuitive to allow operation of all lighting settings by untrained personnel. In rooms with AV systems, an interface should be provided to allow the AV controls to change the lighting to the proper setting.
Table 3  Lighting Criteria for Office Spaces and Restrooms

<table>
<thead>
<tr>
<th>Space</th>
<th>Target Light Level</th>
<th>Power Allowance (including adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Office Areas</td>
<td>10 HFC, 3 VFC</td>
<td>35-50 HFC</td>
</tr>
<tr>
<td>Private Offices</td>
<td>10 HFC, 3 VFC</td>
<td>35-50 HFC</td>
</tr>
<tr>
<td>Small Conference Rooms</td>
<td>10 HFC, 3 VFC</td>
<td>30 HFC, 3 VFC</td>
</tr>
<tr>
<td>in case of flexible</td>
<td></td>
<td>Whiteboards: 5 VFC</td>
</tr>
<tr>
<td>furnishings:</td>
<td></td>
<td>Blackboards: 50 VFC</td>
</tr>
<tr>
<td>30 HFC, 3 VFC</td>
<td></td>
<td>Video Capture: follow AV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>equipment specifications</td>
</tr>
<tr>
<td>Restrooms</td>
<td>5 HFC, 3 VFC</td>
<td>not applicable</td>
</tr>
</tbody>
</table>

Restroom Lighting

Restroom lighting should be simple and effective. Illumination of vertical surfaces should be emphasized as bathrooms tend to be small spaces with ample vertical surfaces such as walls, stall dividers, and mirrors. Indirect lighting of these surfaces can be achieved with ceiling coves or recessed high-efficiency, low-glare fixtures. Illumination should also be sufficient for proper cleaning of the restrooms.

Public Space and Circulation Area Lighting

Most of the public spaces in the State House are circulation areas where lighting is required to accommodate navigation and ensure the safety of visitors and staff. In circulation areas an average level of 5 HFC should be maintained, particularly in stairways, for life-safety. Wayfinding for visitors can be improved by using a consistent color-temperature for all lamps in circulation areas throughout the State House.

Specific accent illumination of artwork and unique architectural features is also an effective way to help direct visitors through a space while saving energy on general illumination.
Table 4 Lighting Criteria for Public Spaces

<table>
<thead>
<tr>
<th>Space</th>
<th>Target Light Level</th>
<th>Power Allowance (excluding adjustment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lobbies</td>
<td>10 HFC 3 VFC</td>
<td>2.3 W/SF (1.3 W/SF base)</td>
</tr>
<tr>
<td>Exhibition Spaces</td>
<td>30 HFC 3 VFC</td>
<td>2.0 W/SF (1.0 W/SF base)</td>
</tr>
<tr>
<td>Atriums</td>
<td>10 HFC 3 VFC</td>
<td>1.6 W/SF + 0.2 W/SF for each floor above third (0.6 W/SF base)</td>
</tr>
<tr>
<td>Corridors</td>
<td>5 HFC</td>
<td>1.5 W/SF (0.5 W/SF base)</td>
</tr>
<tr>
<td>Stairways</td>
<td>5 HFC</td>
<td>1.6 W/SF (0.6 W/SF base)</td>
</tr>
<tr>
<td>Legislative Chambers</td>
<td>10 HFC; 35-50 HFC at work surfaces 3 VFC</td>
<td>2.3 W/SF (1.3 W/SF base + 1.0 W/SF additional allowance)</td>
</tr>
<tr>
<td></td>
<td><strong>General levels</strong></td>
<td></td>
</tr>
<tr>
<td>Legislative Chambers</td>
<td>To be determined by broadcast lighting directors, based on camera requirements.</td>
<td>Exempt from power allowances in the Massachusetts Energy Code</td>
</tr>
<tr>
<td></td>
<td><strong>Broadcast levels</strong></td>
<td></td>
</tr>
<tr>
<td>Artwork</td>
<td>30 VFC</td>
<td>Calculate as part of an entire space.</td>
</tr>
</tbody>
</table>

When certain features are more brightly lit than their surroundings, visitors identify them quickly and move in the appropriate direction. Viewing artwork requires a higher level of light than surrounding circulation spaces at typically a 3:1 contrast ratio. Targeting higher illumination on specific features enhances energy efficiency by allowing lower general light levels necessary for circulation purposes. In Significance Level 1 areas of the State House, noteworthy artworks and architectural features should be accented with secondary illumination. In Significance Level II and III areas architectural features that define a space or artwork of special significance should also be considered for secondary accent illumination.
For artwork that is considered sensitive to light (such as tapestries and paintings) care must be taken to ensure that both electric light and natural light do not harm the integrity of the artwork. In consultation with the Massachusetts Art Commission, a museum lighting specialist should establish lighting criteria for each at-risk piece.

**Legislative Chamber Lighting**

Legislative chambers and hearing rooms should also take a layered approach to illumination in order to limit energy usage. A general layer of light should be provided for the room, but a second layer of task lights added to individual desks can bring the work surfaces up to 35-50 footcandles for reading. With this lighting design, target light levels can be achieved without consuming energy over a large swath of the space. The addition of task lights to the desks in the House or Senate Chambers would however have to be carefully evaluated for their historic appropriateness and reversibility.

A third layer of light will be required to support TV broadcast. Broadcast-quality cameras require a higher level of illumination to capture images than the human eye; therefore supplemental lighting must be provided for successful recording. The broadcast lighting should also be designed to provide light at high vertical angles between 45 and 75 degrees in order to evenly light the face through direct illumination, while minimizing facial shadows under the eyes. Broadcast lighting should also use light sources that have a high color rendition index (CRI) and are flicker-free. The broadcast lighting system must be controlled separately from the general and task lighting of the space so that extra illumination may be turned off when broadcasts are finished. Controls for broadcast lighting should be located in a secure area for use by trained personnel only. Similar to the design solution for task lighting, broadcast lighting for the Senate and House Chambers must be implemented in such a way limit its visual impact on the historic character of the space.
Interior Acoustics

Design Process
The modification of interiors and the introduction of new equipment and mechanical systems have impacted the acoustic qualities of spaces throughout the State House building. In many of these spaces, the acoustic performance does not match the current intended use. Such conditions can negatively impact staff comfort and productivity, may lead users to avoid using certain otherwise appropriate spaces, and generally result in less-than-optimal use of building spaces.

In all cases, the addition of acoustic materials poses a risk to altering the appearance of a historic interior. For example, replacing existing plaster with acoustic plaster may be appropriate relative to the functional demands of the space. In other cases where plaster has been determined to possess a unique age or craft, or retains decorative paint, replacement may be unacceptable.

The following guidelines demonstrate the proper consideration of acoustical factors to insure comfortable and well-functioning working environments. The guidelines, however, are not a substitute for the input of a qualified acoustical consultant which should be included in all projects requiring improvements in historic interiors.

Acoustic Criteria
Acoustic solutions must first determine the appropriate acoustic conditions for a space according to its use. State House acoustical conditions were recorded on October 30, 2009 and are provided in Appendix F of this document. The measurements and survey of existing spaces formed the basis of the guidelines. The terminology is referenced:

**Acoustical Privacy**
The absence of intrusion of sounds from nearby spaces. May also refer to the inability of people in nearby spaces to hear or understand one’s own speech. Acoustical privacy is a matter of degree, and different spaces require different levels of it.

**Background Noise**
Noise or sound that exists in a space independent of the activities that take place in the space. Typically, background noise is noise produced by building systems, primarily HVAC systems. Background noise or sound may refer to steady broadband noise produce intentionally by an electronic sound masking system.
Noise Criterion (NC)
An NC level is a standard that describes the relative loudness of a space, examining a range of frequencies (rather than simply recording the decibel level). This level illustrates the extent to which noise interferes with speech intelligibility. NC should be considered for any project where excessive noise would be irritating to the users, especially where speech intelligibility is important.

Reverberation Control
Measures taken to reduce the reverberation of sound in a space, i.e., the addition of sound absorbing treatments to the surfaces of a space. Ceilings and walls are almost always the most efficient locations for sound absorbing treatments, though floor coverings (carpet or rugs) and room furnishings can be beneficial as well in some situations.

Sound Transmission Class (STC)
An STC rating is a number rating that is used to specify and compare different partitions according to the reduction in noise levels that the partition provides. The rating is used to compare interior partitions, ceilings/floors, doors, windows and exterior wall configurations. In general, a higher STC rating will block more noise from transmitting through a partition.

Acoustic Materials
The acoustic improvement of a space is determined by the type of construction assembly, selection of material finishes, and installation of technology or equipment.

Where appropriate in historic spaces and spaces with limited ceiling clearance, acoustically-absorptive finish materials can be applied directly to the existing ceiling. Known as direct-applied systems, they are also suitable for installation on walls. This type of installation conserves ceiling height, or be adjusted to match a wall profile, and offers a moderate degree of acoustic improvement over traditional hard finish materials. For food preparation and service spaces, a specific class of acoustically-absorptive ceiling and wall materials is intended for routine cleaning with water and other cleaning fluids.

Suspended or “dropped” ceilings are appropriate for rehabilitation projects in spaces with limited historic significance that have adequate height to structure. Such ceiling systems are often used to conceal ductwork and other building features located above the ceilings.
Electronic sound masking is a system consisting of loudspeakers and control components whose purpose is to produce steady background noise at a specified level in a space. These loudspeakers are typically located in or above a suspended ceiling, though other configurations are possible. These systems are often specified for open office work areas and require the input of a qualified audio systems consultant or audio-visual integrator.

**Office Space Acoustics**

The majority of State House area is devoted to office suites containing several types of spaces: private offices, open office areas, conference rooms, reception areas, and circulation. In most cases, the acoustic improvement of these spaces represents one of the greatest challenges to preserving the character of historic interiors.

Many original office suites have been sub-divided with partial-height partitions to accommodate multiple occupants. Partial-height walls and some partition types do not provide adequate acoustical privacy, and in reality the spaces function more like open plan office workstations. In addition, existing offices with original hard-plaster or gypsum board ceilings are sound-reflective and may result in less-than-optimal speech intelligibility for occupants. Existing offices served by both ducted air handling unit (AHU) systems and fan coil units (FCU) at the windows were recorded to have excessive sound levels. Improving the acoustic conditions in any of these working environments will require redesign of both partition and wall systems and mechanical systems. The effects of these interventions must be balanced according the significance level of the space.
Private Offices

To provide acoustical privacy, walls of private offices should extend to the ceilings. Where suspended grid ceilings are used, walls should extend at least 6 inches beyond the height of the ceiling. Where a higher “confidential” level of speech privacy is required, walls must extend and seal to a hard ceiling or to structure above, and doors should be equipped with perimeter gaskets and drop bottoms. For enhanced speech intelligibility, it is beneficial to provide acoustically absorptive ceilings in private offices. These may be suspended ceilings, or acoustically absorptive finishes may be applied directly to existing ceilings. For comfort and ease of speech communication, background noise due to mechanical systems should be moderately low, approximately NC-30 to NC-35. As existing mechanical systems are replaced, they should be selected to achieve lower noise levels, particularly if FCUs are replaced by systems that are not user-controllable and run continuously.

Open Office Areas

To provide an appropriate level of acoustical privacy between workstations the following three guidelines must be followed:

- Workstation barrier panels or related furniture systems must be between 60 inches and 72 inches in height to provide acoustic benefits. Height designs should be coordinated with existing room conditions to maximize clear lines of sight to exterior windows when appropriate. To aid daylighting, glazed panels may be used at the upper portions of these panels.

- Acoustically absorptive ceilings reduce the reflection of sound from one workstation to the next and improve the effectiveness of workstation barriers.
Moderately high background sound levels (NC 40 to NC-45), preferably provided by an electronic sound masking system, increases acoustical privacy by masking speech to nearby workstations and reduces the likelihood of distraction by one's co-workers. In some cases, continuously-operating AHU systems will provide this level of background noise; however, electronic sound masking systems are preferred because they are generally both more effective and less bothersome than mechanical noise. A moderate level of background noise is acceptable in these spaces.

Conference Rooms

Conference rooms are dedicated spaces for meetings of groups of people and are separated from surrounding spaces with doors. They are acoustically critical spaces and require acoustical separation from their surroundings, low background noise, and effective reverberation control - all to ensure good speech intelligibility among groups and to remote participants (via speakerphone or other technologies).

For acoustical privacy, walls must extend to the structural deck or to a sound barrier ceiling such as plaster or gypsum board. Wall construction should meet a STC 50 rating or better, which is typically achieved with two layers of gypsum board on each side of a metal stud wall having an insulated cavity. Doors must close tightly against their frames and must not have significant undercuts at their bottom. For best results, door frames should include perimeter gaskets and drop bottoms. Glazed areas of these walls or doors require ⅜”-thick laminated glass.

Wall and ceiling finishes should additionally have acoustically absorptive treatments achieved with panels or coatings. For smaller conference rooms, it may be sufficient to install an acoustical absorption material on the entire ceiling and limit vertical treatment to two perpendicular walls. All wall panels should extend, at minimum, from approximately 3 feet above finish floor to approximately 7 feet above finish floor to effectively prevent reflection of speech. For larger conference rooms, it is often desirable to include an area of acoustically reflective material above the center of the room, and to offset this area with greater coverage of acoustically absorption at the walls.

To maintain low background noise in conference rooms, HVAC systems must be designed to achieve levels of NC-25 or lower. This is especially critical for larger rooms or rooms that will be used for remote communication.
Table 5  Acoustic Criteria

<table>
<thead>
<tr>
<th>Space</th>
<th>Background Noise Allowance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lobbies</td>
<td>NC 30 to NC-35</td>
</tr>
<tr>
<td>Legislative Chambers</td>
<td>NC-30 or less</td>
</tr>
<tr>
<td>Open Office Areas</td>
<td>NC-30 to NC-35</td>
</tr>
<tr>
<td>Private Offices</td>
<td>NC-35 to NC-40</td>
</tr>
<tr>
<td>Small Conference Rooms</td>
<td>NC-25 or less</td>
</tr>
<tr>
<td>Reception Areas</td>
<td>NC-40 to NC-45</td>
</tr>
<tr>
<td>Hearing Rooms</td>
<td>NC-25 to NC-35</td>
</tr>
</tbody>
</table>

Reception Areas

Some office suites require reception areas where visitors are greeted and administrative business is transacted and discussed. Acoustical privacy is not a major requirement in these areas. However, to prevent speech and activity noises from carrying to nearby workspaces, acoustically absorptive ceilings should be included in these areas. Moderately high background sound levels between NC-40 and NC-45, preferably provided by an electronic sound masking system, are desired to reduce the likelihood that visitors will overhear sensitive speech in nearby workspaces. In some cases, continuously-operating AHU systems will provide this level of background noise; however, the addition of electronic sound masking systems are preferred because they are generally both more effective and less bothersome than mechanical noise.

Hearing Room Acoustics

Hearing rooms accommodate structured discussions among large groups of people. The primary acoustical requirement is for speech intelligibility. Speech amplification is used in these rooms for all or nearly all events, but natural speech (e.g., questions from audience members) should be intelligible as well. Acoustical privacy must be maintained between nearby spaces so that hearing room discussions neither overflow into adjacent spaces nor become disturbed by external noise.

Walls should extend and seal to the structural deck above or a hard ceiling such as plaster or drywall. Walls should be designed to meet STC 50 (e.g., two layers of gypsum board on each side of a metal stud wall with an insulated cavity). In some existing cases, adjacent hearing rooms are separated by operable walls. In general, this is not a good practice because operable walls frequently underperform and degrade acoustically over time.
For good intelligibility of speech, it is important to control reverberation in these large spaces with the use of acoustically absorptive finish materials at the walls and ceilings. Acceptable designs will include such treatments on a combination of wall and ceiling areas, but proper distribution and coverage will depend on the room’s size and shape.

Hearing room doors should be solid core and fit tightly within their frames. Frames should be equipped with perimeter gaskets and drop bottoms. Ideal sound isolation is achieved with entrance vestibules.

Hearing rooms rely on well-functioning sound amplification systems, including microphones, cabling, amplifiers, loudspeakers, and control systems. The overall design of these systems should be performed by a qualified audio systems designer.

To maintain intelligibility for natural speech, HVAC systems must be designed for maximum background noise levels of NC-25. Amplified speech may remain intelligible with background noise levels up to NC-35, but above this, an unamplified speaker will need to speak loudly and may not be heard by all.

Public Space and Circulation Area Acoustics

Many of the historic public spaces of the State House are not ideally suited for public speaking events. For example, the monumental halls of the Brigham Extension are acoustically adjacent to larger corridors or atria. The historic nature of these spaces naturally has made them desirable backdrops for ceremonial speaking events. However, their large volumes and the presence of stone surfaces or other hard materials make them excessively reverberant. Speech events in these spaces often use portable sound amplification systems, yet speech intelligibility typically remains poor.

In order to preserve the character defining features and materials within many of these spaces, it will likely be difficult or impossible to incorporate acoustically absorptive materials through rehabilitation. Instead a custom-designed, sound amplification system should be installed to achieve the best possible speech intelligibility in many of these spaces. These designs will require the services of a qualified acoustical consultant and/or audio systems designer.

Major Circulation Areas

Major corridors and other circulation spaces promote impromptu gatherings or cell phone conversations. This activity takes place most frequently outside hearing rooms, at corridor intersections, or in expanded spaces at stairs and elevators. Where possible, such spaces
should incorporate acoustically absorptive materials that do not compromise the historic character of the spaces, preferably at the ceilings. Additional improvements may include acoustically-treated alcoves or stations for individual cell phone use. Careful design consideration must be given to the location of such stations and to their integration into the existing architecture.

**Doric Hall**

Proposed upgrades for this single-story lobby within the Bullfinch Block should consider alternatives to control reverberation and enhance speech communication among multiple simultaneous users, such as tour groups and the potential addition of food service customers. The most effective locations for sound absorbing treatments occur at the ceiling and boundary walls of this space where acoustic plaster could be installed. However, the demands for speech intelligibility must be balanced with the preservation of historic finish materials, namely the 1890s-era restored ceiling. When specifying temporary partitions or any other features required for exhibits and other functions, materials with high acoustical absorptive qualities should be chosen. Frequent use of this space for public speaking events suggests installation of a custom-designed sound amplification system.

**Main Stair Hall & Great Hall**

The Main Stair Hall of the Brigham Extension is a large open space, six stories tall, that includes wide corridor areas on every level. The corridors and stair landings play host to informal and formal speaking activities, which often occur simultaneously. In this reverberant space, these activities typically create a steady background cacophony that makes conversation difficult. Additionally, sounds in this space carry to other adjoining spaces.

The tall and narrow Great Hall adjacent to the State Library is used for various public events including speeches, ceremonies, and buffet dining. The space is also extremely reverberant, and has significant background noise.

For both halls, the installation of acoustically absorptive materials should be investigated that will not diminish the architectural integrity or significance of the interiors. Based on initial survey, the least intrusive locations for this installation may be at the ceilings of the surrounding 1st and 4th floor corridors. In the Great Hall fewer opportunities exist to add acoustically absorptive materials, however redesign of the associated HVAC system should be considered to reduce background noise levels.
Nurses Hall & Hall of Flags

Like the adjacent Main Stair Hall, these contemporary historic spaces open to the main corridors and are used for both circulation and ceremonial purposes. These spaces are the most honorary and monumental of the State House historic interiors. Both their large volumes and their many surfaces of stone and other hard materials create a very reverberant environment which is not optimal for speech events. However, events will continue to occur in these spaces and a custom-designed, permanent sound amplification system may be considered to provide the best possible speech intelligibility in these acoustically challenging interiors.

State Library Reading Room

The Library Reading Room is a tall, narrow space with many hard surfaces and significant reverberation. The conditions of this space are benefitted by requirements for silent activity, but users may still be disrupted by quiet speech or reverberant noise from activity surrounding the room. In this space, an electronic sound masking system is the most appropriate measure to reduce these acoustical distractions.

House & Senate Chambers

The House Chamber is equipped with a sophisticated speech reinforcement system, which is used for all House business. Proper function of this system depends on low background noise levels that current measurements indicate should be reduced through an HVAC system redesign. Acoustically absorptive materials may be appropriate at gallery-level ceilings and walls. This will reduce the transmission of observer noise and help reduce reverberation within the Chamber.

The Senate does not currently utilize speech amplification in the Chamber. Natural speech intelligibility in this space is generally good on the main floor, assuming background noise levels remain at or below current recordings of NC-30 to NC-35. Speech intelligibility in the Gallery could be improved with the controlled use of a speech amplification system. Reverberation in the Chamber is noticeable but not problematic on the main floor. Similar to the House Chambers, acoustically absorptive material at Senate gallery-level ceilings and walls can reduce the intrusiveness of activity noise in the Gallery and will reduce the transmission of observer noise and help reduce reverberation within the Chamber.
Gardner Auditorium

Gardner Auditorium is the largest State House space for seated public events. The proposed rehabilitation of the auditorium should improve speech intelligibility for both natural speech and amplified speech given the wide range of public events scheduled for this space. Optimal intelligibility will depend on appropriate architectural and interior design as well as a custom-designed sound amplification system. Designs should also consider requirements for radio and television broadcast, as well as possible remote audience participation via audio and video link.

Food Service and Eating Areas

Food service areas are often noisy due to kitchen and dishwashing equipment, plating, and other activities. The significant use of acoustically absorptive finishes can greatly enhance the quality of casual conversation and the use of these areas as work spaces. In single-height spaces acoustically absorptive ceilings should be installed throughout. For larger dining spaces, a qualified acoustical consultant should be utilized to specify acoustic treatments that are suitable for use in food preparation and service areas.
Building Systems

Building systems are defined as the functional, interacting, or interdependent components necessary to operate a building’s working environment. They include mechanical, electrical, plumbing, communication, data, and fire-protection systems.

The introduction of new building systems will typically represent the greatest challenge to the preservation of State House interiors. In most cases, the period of original construction predates the advent of system technology and therefore offers limited spatial allowances or pathways to route new additions. The present condition of most State House interiors includes many episodes of such additions which due to their ad hoc installation, may not be optimally coordinated, efficient, or aesthetically appealing. In many cases, the functional improvement of an interior space will demand extensive overhaul of all associated building systems.

All work should be completed in full compliance with current applicable codes, designed and stamped by licensed professional engineers, and constructed by licensed contractors. In addition, the following guidelines provide criteria to insure the quality and efficiency of the proposed work.
Systems Design Principles

The overall principles to guide building system design can be summarized as follows:

- Provide for the replacement of obsolete systems and equipment.
- Improve net energy efficiency.
- Where possible, maintain existing chases or cavities (mechanical, electrical, plumbing, etc.) to limit alteration of interiors. When decorative or expressed, preserve original registers and fixtures.
- For spaces of Significance Levels I-III, eliminate surface-mounted conduit and replace with concealed conduit in existing or newly excavated wall cavities.
- For spaces of Significance Levels IV-V, new building systems may be integrated in an exposed manner. These systems should be well-crafted and of a durable and aesthetically-appealing design.

Further criteria for Plumbing, Tele-communication, and Mechanical System design are specified in Table 6.

<table>
<thead>
<tr>
<th>Table 6 Building System Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Type</strong></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
</tbody>
</table>
| Plumbing        | • Water conservation devices shall be installed in compliance with the requirements of the Massachusetts State Plumbing Code and Massachusetts LEED Plus.  
     • Dual-flush valves or sensors should be installed on water closets, sensors should be installed on urinals, metering- or sensor-type faucets should be installed on lavatories; existing or proposed showers require restricted flow type shower heads. |
| Tele-communication | • Divide communication distribution by building zone to enhance local departmental control of electronic assets and cabling management.  
     • Telecom sub-zones should be of moderate size to serve patterns of internal use, office configurations, and telecom equipment.  
     • Telecommunication pathways throughout the facility should be located to create consistent horizontal and vertical distribution.  
     • Provide adequate cooling and service access at all equipment  
     • ANSI/TIA-569-B ‘Commercial building standards for telecommunication pathways and spaces’ and ‘BICSI TDDM (telecommunication distribution methods manual) |
HVAC, Mechanical

- Ventilation air shall be provided to all spaces.
- The 2-pipe fan coils located at perimeter offices rely on outdoor air from operable windows. Although outdoor air ventilation is important for indoor air quality, these existing systems result in considerable wasted energy from air leakage during peak heating and cooling seasons.
- Provide occupant controls in common areas. Fan coils and associated thermostats should serve the spaces in which they are located.
- New air-handling units should employ DDC controls, premium efficiency motors and air-side economizer cycles.
- DDC building-wide automation system and phase out of all pneumatic devices and control equipment.
- Improved occupancy monitoring to shut off ventilation air and to setback temperatures during unoccupied periods, along with demand controlled ventilation strategies for each zone.
- New air handling units should incorporate an energy recovery wheel to pre-treat the 100% outdoor air with energy recovered from the relief air, variable frequency drives, and premium efficiency motors.
- Zone isolation dampers should be provided throughout the ventilation air system to allow ventilation air to be shut off to unoccupied zones. Demand control ventilation, employing carbon dioxide monitoring, prevents over-ventilation of minimally occupied spaces.
- Install a free-cooling heat exchanger in the central plant to allow the plant to generate chilled water without running the chillers when the outside conditions are optimal.
- Existing HVAC equipment scheduled for retention should be re-commissioned. All new equipment must be commissioned per Massachusetts LEED Plus.
- Alternate strategies for the generation of hot water and chiller water should be explored, including geothermal wells, fuel cells, cogeneration, solar.

| Table 7  Building System Criteria, continued. |
|----------|-------------------|
| System Type | System Criteria |
| HVAC, Mechanical | • Ventilation air shall be provided to all spaces. |
| | • The 2-pipe fan coils located at perimeter offices rely on outdoor air from operable windows. Although outdoor air ventilation is important for indoor air quality, these existing systems result in considerable wasted energy from air leakage during peak heating and cooling seasons. |
| | • Provide occupant controls in common areas. Fan coils and associated thermostats should serve the spaces in which they are located. |
| | • New air-handling units should employ DDC controls, premium efficiency motors and air-side economizer cycles. |
| | • DDC building-wide automation system and phase out of all pneumatic devices and control equipment. |
| | • Improved occupancy monitoring to shut off ventilation air and to setback temperatures during unoccupied periods, along with demand controlled ventilation strategies for each zone. |
| | • New air handling units should incorporate an energy recovery wheel to pre-treat the 100% outdoor air with energy recovered from the relief air, variable frequency drives, and premium efficiency motors. |
| | • Zone isolation dampers should be provided throughout the ventilation air system to allow ventilation air to be shut off to unoccupied zones. Demand control ventilation, employing carbon dioxide monitoring, prevents over-ventilation of minimally occupied spaces. |
| | • Install a free-cooling heat exchanger in the central plant to allow the plant to generate chilled water without running the chillers when the outside conditions are optimal. |
| | • Existing HVAC equipment scheduled for retention should be re-commissioned. All new equipment must be commissioned per Massachusetts LEED Plus. |
| | • Alternate strategies for the generation of hot water and chiller water should be explored, including geothermal wells, fuel cells, cogeneration, solar. |
Life Safety and Fire Protection

Future State House work requires an integrated approach to fire and life safety improvements. These will include replacement or upgrade of fire detection, alarm, and suppression systems in coordination with improvements to existing fire separations and modes of egress.

The network fire detection and alarm system should be Class A, and should be installed in a location approved by the Boston Fire Department. Because of its size and requirements for visibility and access, the location and installation of the system control panel will require coordination with preservation priorities and regulatory review.

New fire alarm systems should be closely coordinated with any planned security, access control or mass notification improvements considered or planned. The system’s main control unit and remote transponder nodes should be capable of providing the following functions at a minimum:

1. monitor the operating range and sensitivities of spot smoke detectors;
2. provide an alternative capability for compliance with sensitivity ranges and testing requirements;
3. provide enhanced interface capabilities for fire safety functions such as door releases;
4. capability to integrate future smoke management functions; integration and interface of security and access control systems; and
5. enhance and provide voice evacuation capabilities and networking features via connectivity with a local or wide area network, providing alternative means of remote reporting alarms, system status, supervisory and maintenance alerts to alternate locations, to mobile phones or to other handheld electronic devices such as PDAs.

Section 4 of the Design Guidelines recommends NFPA Guidelines 904 and 914 for expansion of automatic sprinkler protection throughout the facility. This approach will assess the value and necessity of full coverage in areas of high historic significance. The zoning of new fire suppression systems should align with planned refuge areas and zones to maximize the capabilities of alarm reporting and evacuation planning. The existing floor openings and associated compartments adjacent to the unenclosed floor openings require further study and evaluation to develop concepts for a smoke management system.
The high degree of finish found in most of the State House historic interiors does not suggest the use of exposed sprinkler pipe. In most cases, concealed sprinkler heads should be incorporated in existing finish surfaces—whether horizontal or vertical. This installation should seek to maximize sprinkler pipe distribution within non-historic wall and ceiling cavities and limit demolition of historic materials. In some cases, it may be appropriate to “furr out” and enlarge an existing architectural feature such as a beam, column, or soffit in order to conceal sprinkler pipe distribution (Figure 69). In other
scenarios, such as the ceiling skylights of the Brigham Extension, the sprinkler piping can be coordinated with the existing framing systems and left exposed above the glass laylights. Exposed sprinkler heads can be extended through strategically placed pockets in the glass assembly to provide coverage below.
4 Process and Project Guidelines

Introduction
Section 4 defines the process for implementing furnishing, architectural and/or engineering services and projects at the Massachusetts State House. These procedures are to be used by state employees, private contractors, or any entity contemplating or engaged in State House improvement projects. This process will enable design, construction, and maintenance teams to create safe, efficient and comfortable spaces, while insuring the criteria for historic preservation and rehabilitation defined in the preceding sections.

This section will demonstrate:
- How projects utilize the guidelines described in Sections 1, 2, and 3, and in the Appendices
- Summary of regulatory and code compliance procedures and considerations
Project Management Procedures

Application of Guidelines

The technical and administrative procedures outlined in the Design Guidelines shall be followed for all design and construction projects, including maintenance work orders. Although furniture shall be procured through general contracts, the selection of furnishings and applicable equipment are subject to the same criteria defined in the Design Guidelines.

Projects proposed for the State House shall, in addition to other requirements, follow the following steps. These are discussed with respect to Space Planning in Section 3 and are more generally stated in this section as they are intended to apply to all proposed work.

Planning

Planning is the critical first step for State House design projects and identifies information required for the final decision-making process. Pre-design planning:

- insures the appropriate treatment of the building’s unique historic materials and assemblies, described in Section 2,
- establishes the criteria to guide the rehabilitation of interiors, as discussed in Section 3, and
- compiles the regulatory requirements that govern state projects, as listed in this section.

Planning for proposed work in spaces operated by the House and Senate, shall be initiated by the House or Senate Business Officer. For work in spaces operated by the Executive Branch and Constitutional Office, planning shall be initiated by the appropriate administrative staff.

The aforementioned staff shall contact the Bureau of State Office Buildings (BSB) and be responsible for completing with BSB staff a “Room Data Sheet” to record existing conditions of the space and the user needs for improvement.

As discussed in Section 3, the Room Data Sheet is intended to record existing information, insure that the Level of Significance of the area of work and its requirements and standards are clearly understood and recorded, define proposed requirements, and note current problems. The Room Data Sheet should be completed by BSB staff in coordination with the project proponent. Sources of data should be the Building Information Model (BIM) developed in the Master Plan, direct inspection, measurement,
photography and other data including measurement of interior air quality, noise, temperature, lighting levels and other factors by BSB staff, proponents and designer and consultant as required. The Room Data Sheet should be the basis for a description of the proposed work for a particular space or system.

**Proposed Design Council Review**

In order to apply these guidelines systematically to all work in the State House, a State House Design Council is proposed. The Council will be responsible for initial review of all work proposals for the State House. These will be submitted in the form of Room Data Sheets and accompanying descriptions of proposed work. The State House Design Council will be composed of designated DCAM and BSB staff, the Massachusetts Art Commission, staff of the House and Senate, representatives of the Governor’s office, other Constitutional Officers and other State House occupants. The Council will be chaired by the Superintendent of the Bureau of State Office Buildings (BSB). It will meet regularly to review all proposed projects and provide recommendations and guidance in a timely manner.

Following this review, external regulatory agencies, such as the Massachusetts Historical Commission (MHC) and the Massachusetts Architectural Access Board (MAAB), will receive project notification and determine any procedures required for supplemental review.

The following conditions shall influence the review of work proposed within designated Preservation Zones:

**Level I and II Spaces**

- Historic features must be retained, repaired when necessary, and exposed.
- Historic features shall not be altered, nor finishes changed, unless substantiated by historic documentation.
- In circumstances where new partitions or suspended ceilings conceal a historic feature, the feature should remain intact and not be demolished or removed.
- For exceptions to the above rules, approval must be obtained during the course of review by the Design Council and the Massachusetts Historical Commission, in advance of work. Application must include documentation demonstrating that all options other than alteration, removal, or entombment of the feature have been explored.
• If a feature is approved for removal, whether partial or total, it must be documented in accordance with the Secretary of the Interior’s *Standards and Guidelines for Architectural and Engineering Documentation* listed in Appendix C. Consideration shall be given to salvaging the feature.

**Level III Spaces**

• Historic features must be retained and repaired when necessary unless code compliance, security upgrades, or programmatic requirements warrant intervention.

• For all other conditions, refer to rules for Level I and II Spaces above.

**Level IV and V Spaces**

• Consult the State House Master Plan to identify any inventoried historic feature(s). When present, such features should be retained or salvaged for relocation unless code compliance, security upgrades or programmatic requirements warrant intervention.

• Identified historic features require Design Council approval for alteration or removal.

• Alterations are otherwise allowed in these spaces pending approval of the work order or project by the Design Council without other specific regulatory authority approval.

**Project Management and Implementation**

Major State House improvement projects may be managed by the Division of Capital Asset Management (DCAM) or the Bureau of State Office Buildings (BSB) according to their respective procedures. In any case all projects including smaller efforts conducted by the Legislature shall be coordinated with the Bureau of State office Buildings in accordance with these guidelines.

State House improvement projects will be implemented to insure a safe, and to the greatest extent possible, non-disruptive work environment. Notification shall be given of all project work to any users of the State House that may be affected by disturbances such as noise or accessibility during the course of work.

Implementation schedules should anticipate conditions unique to the State House building. Existing physical dimensions and the location of concealed building systems should be verified to a high level of accuracy prior to the development of construction
documents. This may require the destructive investigation of ceiling, floor, and wall cavities. Many historic restoration treatments and procedures will require testing and mock-ups to achieve compatibility with existing conditions. The installation of new building systems will require a period prior to occupancy for calibration and commissioning of equipment. Following the approval of all improvement work by State House project managers, the space will be subject to regulatory procedures prior to re-occupancy.

All project work shall be documented after completion in coordination with the Bureau of State Office Buildings (BSB). Documentation may include updating of the State House Building Information Model, as-built drawings, documentation of materials used and other information.
Regulatory Narrative

The following text is provided only to summarize the primary codes applicable to State House projects. All projects must be individually evaluated to determine specific code-related requirements and processes.

Building Classification

The State House occupancy includes both business and assembly uses. Business use functions such as offices and staff support space utilize approximately two thirds of the useable floor area. Assembly use includes a range of assembly functions and scales such as the House and Senate Chambers, the State Library, Gardner Auditorium, hearing rooms and ceremonial public spaces such as Memorial Hall.

Building Codes & Standards

Provisions within Massachusetts General Law define regulatory conditions for the State House that are separate and unique from the Massachusetts State Building Code (MSBC). The provisions assign the authority for the care and maintenance of the State House to the Superintendent of State Buildings subject to any rules established by the Committee on Rules as developed and agreed upon concurrently by the House and the Senate. Additional provisions assign specific responsibilities for fire safety within the State House to the Commissioner of Public Safety and the Superintendent of State Buildings.

The Massachusetts State Building Code

The Design Guidelines recommend MSBC compliance with special provisions for historic structures. State House project designers must consult the MSBC to determine the governing conditions for the applicability and scope of their specific improvement projects.

The MSBC classifies historic structures and buildings as either “totally” or “partially” preserved. These designations allow the MSBC to establish minimum requirements that are sensitive to the significance of the historic features of a building. The State House, although not identified or listed in the building code as a “totally preserved” building, merits the special allowances of this classification which provides compliance exemption for:
• repairs, restoration, reconstruction, and maintenance, provided minimum mandatory safety requirements for fire protection equipment, exit signs, emergency lights, and maximum occupancy are adhered to, and
• energy conservation requirements.

For "partially preserved" buildings, the MSBC provides exemptions for code regulation of repairs or in-kind replacement of the exterior building systems and materials as well as non-structural interior historic features. However, changes in the use or occupancy of buildings or providing new systems to a partially preserved building require full compliance with all of the requirements similar to any existing building.

Applying either set of requirements as a scaled approach maximizes the flexibility necessary for preservation of the State House while addressing current fire and life safety conditions. In addition, both "totally" and "partially" preserved building classifications require compliance with the Massachusetts Architectural Access Board (MAAB) as well as establishing minimum requirements for regular inspections and allowances for spaces with limited egress.

**National Fire Protection Association Standards**

The Design Guidelines recommend the application of National Fire Protection Association (NFPA) codes created for historic structures.

The State House has limited provisions for contemporary means of fire separation. Existing wall and floor/ceiling assemblies have been altered or impaired through various modifications over the life of the State House and therefore provide minimal to no continuous fire separation between the various wings and uses within the building.

The NFPA codes for the Protection of Cultural Resource Properties and Fire Protection of Historic Properties are complementary and provide a performance-based design approach. The codes allow for compliance alternatives including programmatic, administrative, operational, and/or maintenance procedures.

**Energy Code**

Although the Massachusetts Energy Code for commercial buildings offers exemptions for house museums and classified "preserved" buildings, it does not define code compliance alternatives. Therefore, the Design Guidelines recommend application of two alternative approaches, as defined by the U.S. Department of Energy:
Trade-Off Approach

A trade-off approach involves trading enhanced energy efficiency in one component against decreased energy efficiency in another component. These trade-offs typically occur within major building systems (e.g. envelope, mechanical) or in commercial lighting.

Performance Approach

A performance approach (also known as a systems performance approach) compares a proposed design with a baseline or reference design and demonstrates that the proposed design is at least as efficient as the baseline in terms of annual energy use.

Both of these approaches diverge from the strict use of prescriptive insulation and efficiency values and allow greater design flexibility, but they require more design effort. Both approaches require an evaluative comparison – of either individual components or annual energy consumption – to demonstrate the energy conservation measures of the new design.

Sustainable Design Criteria

Massachusetts Executive Order 484 requires all new construction and significant renovation projects over 20,000 square feet to meet the Massachusetts LEED + Criteria.

*Massachusetts LEED + Criteria are provided in Appendix G.*

For projects smaller than 20,000 square feet, all executive agencies shall design and construct new buildings and major renovation projects to meet at least one of the following:

- Adhere to the Massachusetts LEED + Criteria, or
- Surpass the Massachusetts Energy Code requirements by at least 20%, or
- Follow the prescriptive approach of the New Buildings Institute’s Advanced Buildings Benchmark Tool (www.advancedbuildings.net).
Regulatory Overview

All projects must be individually evaluated to determine specific code-related requirements and processes. Work in the Massachusetts State House is typically subject to the following laws and regulations:

- Massachusetts General Law Chapter 8, Sections 6, 7, and 9
- Massachusetts General Law Chapter 143, Sections 2B and 2C
- Massachusetts State Building Code, Current Edition (780-CMR, MSBC)
  - Chapters 2-33 for New Construction
  - Chapter 34 for Existing and Historic Structures
- Americans with Disabilities Act, Accessibility Guidelines (ADAAG)
- National Fire Protection Association (NFPA) Codes 909 and 914
- Massachusetts Historical Commission for applicable spaces of historic significance
- Applicable LEED rating systems and constituent criteria, including those of Massachusetts LEED +
- Review by the Massachusetts Art Commission of improvement projects that may impact historic objects, artworks, and interiors
- Other Regulations as identified by the Bureau of State Office Buildings or the Division of Capital Asset Management.
Application of Design Guidelines to Master Plan

The *Design Guidelines* will help implement the recommendations of the State House Master Plan. The recommendations are organized by ten projects:

I. Basic Infrastructure  
II. Systems Equipment Replacement  
III. North Annex Upgrades  
IV. West Wing Upgrades  
V. East Wing Upgrades  
VI. Historic Core Upgrades  
VII. Library Renovation  
VIII. Public Space and Security Improvement  
IX. Coal Pocket Transformation  
X. Further Sustainability Improvements

Projects one and two comprise work that affects the entire building, while projects three through six describe work to be accomplished by zones that coincide with the life safety approach for the State House. Projects seven through nine address specific targeted programmatic spaces and needs, and project ten again affects the entire building.

The following summaries indicate the relations between a selection of Master Plan project scopes and the *Design Guidelines*.

| Table 8 Project Coordination with Design Guidelines |
|---------------------------------|---------------------------------|---------------------------------|
| **Master Plan Project** | **Historic Material Treatment** | **Interior Design Guidelines** |
| I. Basic Infrastructure  
with a particular emphasis on occupant safety and the rehabilitation of the existing physical materials | Repair water damage to ceiling plaster and wood, including Senate Chamber Dome. | Provide accessibility at existing stone flooring & steps.  
Improve acoustics and lighting in Senate Chamber. |
| III. North Annex Upgrades  
comprehensive upgrade of all seven floors | Restore stone and plaster in existing corridors following modifications for egress compliance.  
Restore ceilings and columns in office suites.  
Minimize cutting and patching of historic materials for sprinkler installation. | Design egress paths and enclosed stairs.  
Plan and design new perimeter offices and corridor support spaces including lighting and acoustics improvements.  
Redesign Public Entry at East Elevation.  
Design fire suppression system. |
### Project Coordination with Design Guidelines, continued

<table>
<thead>
<tr>
<th>Master Plan Project</th>
<th>Historic Material Treatment</th>
<th>Interior Design Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV. West Wing Upgrades</strong>&lt;br&gt;comprehensive upgrade of all seven floors</td>
<td>Restore plaster in existing corridors following modifications for egress compliance.&lt;br&gt;Restore ceilings and columns in office suites.&lt;br&gt;Minimize cutting and patching of historic materials for sprinkler installation.</td>
<td>Plan and design new perimeter offices and corridor support spaces including lighting and acoustic improvements. Design fire suppression system.</td>
</tr>
<tr>
<td><strong>V. East Wing Upgrades</strong>&lt;br&gt;comprehensive upgrade of all seven floors</td>
<td>Restore plaster in existing corridors&lt;br&gt;Restore ceilings and columns in office suites&lt;br&gt;Minimize cutting and patching of historic materials for sprinkler installation.&lt;br&gt;Restore historic materials in Gardner Auditorium.</td>
<td>Plan and design new perimeter offices and corridor support spaces including lighting and acoustic improvements. Design fire suppression system. Rehabilitate Gardner Auditorium, including circulation, egress, lighting, and acoustic improvements.</td>
</tr>
<tr>
<td><strong>VI. Historic Core Upgrades</strong></td>
<td>Restore plaster in existing corridors&lt;br&gt;Restore ceilings and columns in office suites&lt;br&gt;Minimize cutting and patching of historic materials.&lt;br&gt;Restore historic materials in Doric Hall.</td>
<td>Design fire suppression system&lt;br&gt;Plan and design new perimeter offices and corridor support spaces including lighting and acoustics&lt;br&gt;Enhance exhibition and/or mixed-use functionality of Doric Hall</td>
</tr>
<tr>
<td><strong>VII. Library Renovation</strong></td>
<td>Repair water damage to ceiling; restore historic plaster, wood, metal, and glass finishes in Reading Room.</td>
<td>Rehabilitate Reading Room for improved lighting, acoustic conditions and telecommunication service.</td>
</tr>
</tbody>
</table>
Project Design Criteria

Ignoring factors of urgency, Master Plan project can be classified according to criteria affecting their final design. State House projects have been identified according to their improvement of occupant use and safety and/or their enhancement to building spaces and systems. However, traditional approaches to design solutions may be complicated by the physical constraints of the existing building, such as limited floor space or ceiling clearance.

The Project Priority Matrix on the following pages summarizes the Master Plan improvement projects according to their improvement priorities and physical constraints. Two highlighted projects from the matrix are described below:

- The corridor accessibility project on the second floor has a primary concern of accessibility at level changes, as well as the preservation concerns of the existing historic materials in the corridor. These take priority over the tertiary energy efficiency of the proposed motorized installation or of other concerns of daylighting at this location. Egress is a secondary priority because there are two egress paths at both levels and the space adjacent is monitored by guards such that the motorized lift is not intended as an egress pathway.

- The office repairs and reconfigurations on the fourth floor have primary criteria of accessibility, daylighting, and energy efficiency. These are specific to the fourth floor, where many offices are reached via several steps from the main corridor levels, and where daylighting is particularly absent in several suites. Secondary priorities include the constraints of the ceiling height and the presence of isolated historic materials, but these spaces do not have a high level of significance where this would predominate.
## Process and Project Guidelines

### Proposed Use

<table>
<thead>
<tr>
<th>Floor</th>
<th>Proposed Use</th>
<th>Improvement Priorities</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Accessibility/Level Change</td>
<td>Public Wayfinding</td>
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<td></td>
<td>2 Gardner Auditorium</td>
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<tr>
<td></td>
<td>3 Storage/Ancillary uses</td>
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<td>4 Circulation – Horizontal</td>
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<tr>
<td>Basement/First</td>
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<tr>
<td></td>
<td>2 Hearing Rooms</td>
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<td></td>
<td>3 Entry/Security/Circulation</td>
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<td></td>
<td>4 Mechanical Equipment</td>
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<tr>
<td></td>
<td>5 Mech: Vertical Dist.</td>
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<td></td>
<td>6 Mech: Horizontal Dist.</td>
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<td>7 Circulation – Horizontal</td>
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<td>8 Circulation – Vert. Egress</td>
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<td></td>
<td>2 Public Chambers</td>
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<td>3 Library Spaces</td>
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<td>4 Mech: Vertical Dist.</td>
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<td>5 Mech: Horizontal Dist.</td>
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<td>6 Circulation – Horizontal</td>
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<td></td>
<td>7 Circulation – Vert. Egress</td>
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### Legend

- Major
- Medium
- Minor

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2010

EYP Architecture & Engineering, P.C.
### Anticipated Use
(colors reference Master Plan diagrams)

<table>
<thead>
<tr>
<th>Floor</th>
<th>Anticipated Use</th>
<th>Improvement Priorities</th>
<th>Constraints</th>
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<td>2 Hearing Room</td>
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<td>3 Attic Storage</td>
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<tr>
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<td>5 Library Storage</td>
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<tr>
<td>9 Circulation - Vert. Egress</td>
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### Improvement Priorities

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<th>Preservation</th>
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### Legend

- **•** Major
- **○** Medium
- **□** Minor

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Gardner Auditorium Project Example

The following section provides an illustrative example of a potential State House improvement project, and describes the recommended application of the State House Design Guidelines.

Background

The auditorium is an approximately 4,000 square foot tiered assembly space located in the East Wing’s basement and sub-basement levels. It is the largest public hearing room and meeting venue in the State House. The facility includes adjacent restroom facilities, a lobby, and a vestibule with access to Bowdoin Street and the General Hooker entry plaza. The space is utilized for meetings ranging in attendance from tens to hundreds, with a maximum set by current code and available egress.

The State House Master Plan identified the programmatic needs for the auditorium and recommended the following design strategy:

- Given the auditorium’s construction date and sub-grade location, a specific analysis of egress and accessibility compliance is required. The facility’s extensive use for public hearings suggests full compliance with accessibility guidelines for circulation, seating, and podium use. This analysis must also be coordinated with the egress path(s) to grade for the upper floors of the East Wing.

- The design will need an egress-compliant layout of floor-mounted fixed seating with accommodation for accessible seating (modification of north mezzanine for entrance will result in a loss of 80 seats from the currently envisioned maximum capacity). This will also require demolition of non-historic seating partitions to improve sightlines.
• There will need to be a new exterior entrance from the stair to Bowdoin Street and an overall redesign of the circulation, lobby, and pre-function areas. The design will need to incorporate a better connection to the lobby at Bowdoin Street, and therefore the replacement of opaque partitions between balcony and lobby with glazed wall to enliven space.

• Further development of this design will require acoustical consultation for surface treatments and for acoustic optimization of the new mechanical systems. The space requires integrated A/V and projection systems to enhance meeting functionality and conditions, and a customized design of controls for broadcast lighting, A/V equipment, and other technologies.

**Significance Levels and Rehabilitation Strategy**

This auditorium is categorized as a Level IV space. Spaces with Level IV significance are recognized for their utilization value and their appropriateness for rehabilitation. The accommodation of other uses is of less importance than adequately supporting presentation and discussion settings for a range of audience sizes. Therefore, the level of significance enables a considerable range of modifications to accommodate the present use.

For a Level IV space, the approaches defined as “Dialogue” and “Contrast” are appropriate guidelines for the degree of alterations required to improve the auditorium functionality. For example, the installation of new acoustically-absorptive coffers between the existing transfer beams at the ceiling could enhance this functionality, while concealing the location of new building systems.
ROON DATA SHEET & SURVEY

Massachusetts State House

Date: 09/25/2009  Report By: John M. Smith
Department: BSB
Room No.: SB14-1  Room Name: Gardner Auditorium  Preservation Level: 4

USER INFO

Occupancy / Function Type: Public Hearing Room
Typical Hours of Occupancy: variable  Typical No. of Occupants: 600
Typical Access: Staff  Public  Press  Facilities  Security

Identify any unique user information:

Largest occupancy hearing room within State House.

ARCHITECTURAL

Please reference "Masterplan: Kit of Parts Manual" for drawings and descriptions of selections.

Existing Conditions

Dimensions / Room Width: 49'-3"  Room Length: 93'-9"

Major existing building elements?

1. Exterior Windows  Yes  No
2. Exterior Doors  Yes  No
3. Corridor Doors  Yes  No
4. Emergency Exit Doors  Yes  No
5. Structure or Columns  Yes  No
6. Mechanical Chases  Yes  No
7. Floor level changes  Yes  No

Partition Type

Full Solid Panel (A)  Solid Panel + Transom (B)  Wainscot Panel + Glass (C)  Full Glass Panel (D)  Glass Wainscot + Panel (E)  Glass Panel + Transom (F)  Multi Glass Panels (G)  Historic (H)

Flooring Type

Full Solid Panel (A)  Solid Panel + Transom (B)  Wainscot Panel + Glass (C)  Full Glass Panel (D)  Glass Wainscot + Panel (E)  Glass Panel + Transom (F)  Multi Glass Panels (G)  Historic (H)

Ceiling Type

Gypsum Wall Board  Acoustical Tile 2x2  Acoustical Tile 2x4  Acoustical Tile Other  Wood Panel  Plaster  Historic Plaster

Door Type

Wood (D1)  Wood + Transom (D2)  Wood Lite (D3)  Wood Lite + Transom (D4)  Glass (D5)  Glass + Transom (D6)  Hollow Core Metal (D7)  Historic Door (D8)

Architectural Features

Historic Base Board  Historic Chair Rails  Wainscot Paneling  Crown Molding  Ceiling Moldings  Ceiling Medallions  Fireplace Mantles  Pilasters / Columns

Lighting

Ceiling Flush Mounted  Pendant Direct  Pendant Indirect  Pendant Direct/Indirect  Desk Task Lighting  Decorative Lamps  Utility Grade  Historical Fixtures

Window Treatments

Wood Blinds  Vinyl Blinds  Sun Shades  Blackout Shades  Fabric Drapes-Office  Fabric Drapes-Executive  Fabric Drapes-Historic

Acoustical Separation

Full Privacy / Confidenti  Full Privacy  Semi-Private  Not Required

Interior Window Types

Translucent Full Vision  Transparent / Frosted  Transaction Windows

* See Historic Preservation for contextual description.
Historic Material Treatment

The Design Guidelines provide directions for the restoration and maintenance of existing historic materials in the auditorium and adjacent spaces, as identified in Table 12. The replacement of distressed and deteriorated non-historic floor finishes, seating, and doors with new elements shall be appropriate and compatible with original wall treatments, windows, and other elements to remain present in the space.

Interior Design Guidelines

The approach to Gardner applies the following elements of the Design Guidelines:

- expressing and revealing historic features, such as the stone at the main wall;
- minimizing the visual impact of functional interventions, such as using a glazed wall partition between the lobby and the auditorium and concealing lights, HVAC and A/V equipment within new ceilings;
- refraining from imitative design interventions, as this is a space with limited significance, interventions may express contemporary design concepts without mimicking the features of historic spaces found elsewhere in the building;
- designing new interventions to be at a level of architectural quality and durability appropriate to the existing surrounding construction, such as the choice of hardwoods for new millwork and for fixed furnishings;
- designing new interventions to be clearly differentiated yet compatible, such as modifications to stairs and railings for safety and code requirements; and
- executing new work in historic spaces in a manner which is reversible without damage to existing significant materials and features, such as modifications to the stone wall at the north of the room.

Space Planning, Room Data Sheet, and Process

In the example of Gardner, the Evaluation portion of the process was performed during the Master Plan and an additional study by RDK and Margulies Associates for BSB (2007). The Plan and Recommend phases will both need to conclude with review by the State House Design Committee before proceeding to the construction and procurement phases.

The Design Guidelines Room Data Sheet will cover most, but not all aspects of design required for a contemporary large auditorium. In addition to other procedures, a project scope would be submitted to the Design Council followed by MHC and MAAB review.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polished marble panels at West Wall</td>
<td>- Protect and restore existing panels during overall room rehabilitation.</td>
</tr>
<tr>
<td>Plaster walls and trim</td>
<td>- Protect and restore existing decorative plaster walls, pilasters, moldings, and window casings during overall room rehabilitation.</td>
</tr>
<tr>
<td></td>
<td>- Restore any original historic assemblies entombed or concealed by prior room alterations.</td>
</tr>
<tr>
<td></td>
<td>- Coordinate acoustic design with retention of as much existing historic plaster as possible.</td>
</tr>
<tr>
<td>Marble flooring</td>
<td>- Protect and restore existing marble floor paving in lobby and auditorium.</td>
</tr>
<tr>
<td>Cast-iron railings and wood handrails</td>
<td>- Protect and restore existing stair railings.</td>
</tr>
<tr>
<td></td>
<td>- Remove non-historic paint finishes and restore to original finish.</td>
</tr>
<tr>
<td></td>
<td>- Analyze stair railing for egress and accessibility compliance.</td>
</tr>
<tr>
<td></td>
<td>- Investigate alternatives for required railing modification.</td>
</tr>
</tbody>
</table>
1. Stonework and panels to be restored
2. Area for presenters with accessible floor and AV-equipped furnishings
3. Plaster wall panels and features to be restored
4. Glazing and doors at expanded upper and lower lobbies
5. Ceiling zone for systems integration
6. Selected floor materials to be restored and integrated into new accessible floor transitions
7. Expanded tiered seating without solid wall
8. Extension of plaster wall and new stairs within auditorium space

**Figure 73 Gardner Auditorium Rehabilitation Diagram**

*Kit of Parts*

The *Design Guidelines* Kit of Parts will have limited application for a project involving an assembly space such as the auditorium. However, Partition Type C is applicable at the lobby wall overlooking the auditorium, as a new partition behind the existing historic fabric. The project design team should reference the material and product
recommendations within the Design Guidelines during the design and procurement phases of the project.

**Lighting and Acoustics**

To improve the functionality of the auditorium, the project design will require consultants to translate the user needs identified in the Room Data Sheet and prior studies into full design concepts, integrated with the rest of the architectural and engineering considerations, as well as providing construction documents and specifications for related acoustical materials and lighting systems. These sections of the Design Guidelines list criteria particularly applicable to hearing rooms such as Gardner.

**Building Systems**

The scope of work described in the Master Plan for HVAC, plumbing, electrical, telecom, and other systems will need to be coordinated with proposed building system upgrades in the East Wing. The conditions for system integration will vary depending on whether the auditorium is renovated as a standalone project or as part of a larger renovation affecting the East Wing mechanical services and distribution.