MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION STAFF REPORT

Address: 4101 Manor Rd., Chevy Chase Meeting Date: 12/7/2022

Resource: Individually Listed Master Plan Site **Report Date:** 11/30/2022

(Hayes Manor #35/10)

Applicant: Howard Hughes Medical Institute (HHMI) **Public Notice:** 11/23/2022

Susan Pommerer, Architect

Review: HAWP Staff: Dan Bruechert

Brian Crane

Permit No.: 1001591 **Tax Credit:** Partial

Proposal: Comprehensive rehabilitation, site work, tree removals, and new addition

STAFF RECOMMENDATION

Staff recommends the HPC approve the HAWP with four (4) conditions:

- 1. The proposed replacement windows shall be true-divided light (TDL) windows. The applicant shall submit detailed specifications to Staff for final review and approval before permit drawings can be approved.
- 2. The applicant shall submit detailed specifications for the proposed jamb liners to Staff for final review and approval before permit drawings can be approved.
- 3. The applicant shall proceed with their recommended fieldwork as detailed in this HAWP submission, and shall consult with staff regarding any further investigations that may be necessary to document or recover significant archaeological features that may be lost to the proposed construction program, or to discuss minor adjustments to the work program that would allow significant features to be preserved in place.
- 4. After consulting with staff, the applicant may proceed with any additional proposed archaeological fieldwork, if necessary. Once the fieldwork is complete, and prior to approval of the building permit, the applicant shall complete a technical report that documents the archaeological findings and submit the report to Staff.

ARCHITECTURAL DESCRIPTION

SIGNIFICANCE: Individually Listed Master Plan Site #35/10 Hayes Manor

STYLE: Georgian

DATE: 1767 w/ later alterations



Figure 1: The Master Plan Site is located in the southwest corner of the Howard Hughes Medical Institute Campus.

From *Places from the Past*:

"One of the earliest and best-preserved examples of Georgian style architecture in the region, Hayes Manor is characterized by refined detail and high-quality workmanship. The residence was built about 1767 for Reverend Alexander Williamson, rector of Prince George's Paris of the Anglican Church, one of the richest parishes in the Maryland colony. Williamson named the property Hayes after the home of William Pitt, Prime Minister of Britain. With the separation of church and state after the revolution, the Anglican Church was no longer Maryland's established church and Willamson's tax-supported salary ceased. He retreated to Hayes Manor until his death in 1792.

The brick residence has two front facades, customary for high-style Georgian houses. Both facades have expensive all-header bond brick. The south entrance opens into a front stair hall in a double pile plan. East and west wings were built in 1899 and 1908, designed by architect Walter Peter in a compatible style. Notable landscape features include a formal boxwood garden, evidence of a bowling green, and the Dunlop family cemetery. For 173 years, the Dunlop family owned Hayes Manor, beginning with Scottish immigrant James Dunlop who owned the estate from 1792."

BACKGROUND

On August 17, 2022, the HPC heard a Preliminary Consultation on the proposed work.¹ The HPC was supportive of the proposal and appreciated the high level of research that has gone into developing the proposal. The Commissioners found the work proposed for the building was appropriate, but expressed reservations about the large number of trees proposed for removal and had outstanding questions about

¹ The Staff Report for the Preliminary Consultation is available here: https://montgomeryplanning.org/wp-content/uploads/2022/08/II.B-4000-Jones-Bridge-Road-Chevy-Chase.pdf and recording of the hearing is available here: https://mncppc.granicus.com/MediaPlayer.php?publish_id=d894867c-1f09-11ed-b1ab-0050569183fa and begins at approximately 3:10:00.

the proposed walkway, information about the proposed shutters, and the louvers in the attic.

The applicant conducted an additional archaeological investigation at sites that could be impacted by the work. The findings are attached to the application and HP Archaeological Staff provides additional recommendations based on those findings.

PROPOSAL

The applicant proposes to rehabilitate the house for it to serve as the primary residence for the Howard Hughes Medical Institute's (HHMI) president and improve the surrounding landscape and hardscape to serve its new use.

APPLICABLE GUIDELINES

Proposed alterations to individual Master Plan Sites are reviewed under Montgomery County Code Chapter 24A (Chapter 24A) and the *Secretary of the Interior's Standards for Rehabilitation*. Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features, which convey its historical, cultural, or architectural values.

Montgomery County Code; Chapter 24A-8

- (a) The commission shall instruct the director to deny a permit if it finds, based on the evidence and information presented to or before the commission that the alteration for which the permit is sought would be inappropriate, inconsistent with or detrimental to the preservation, enhancement or ultimate protection of the historic site or historic resource within an historic district, and to the purposes of this chapter.
- (b) The commission shall instruct the director to issue a permit, or issue a permit subject to such conditions as are found to be necessary to ensure conformity with the purposes and requirements of this chapter, if it finds that:
 - (1) The proposal will not substantially alter the exterior features of an historic site or historic resource within an historic district; or
 - (2) The proposal is compatible in character and nature with the historical, archeological, architectural or cultural features of the historic site or the historic district in which an historic resource is located and would not be detrimental thereto or to the achievement of the purposes of this chapter; or
 - (3) The proposal would enhance or aid in the protection, preservation and public or private utilization of the historic site or historic resource located within an historic district in a manner compatible with the historical, archeological, architectural or cultural value of the historic site or historic district in which an historic resource is located; or
 - (4) The proposal is necessary in order that unsafe conditions or health hazards be remedied; or
 - (5) The proposal is necessary in order that the owner of the subject property not be deprived of reasonable use of the property or suffer undue hardship; or
 - (6) In balancing the interests of the public in preserving the historic site or historic resource located within an historic district, with the interests of the public from the use and benefit of the alternative proposal, the general public welfare is better served by granting the permit.

Secretary of the Interior's Standards for Rehabilitation

- 2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.
- 9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportions, and massing to protect the integrity of the property and its environment.
- 10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

STAFF DISCUSSION

The proposed work will help put Hayes Manor back into productive use. The house sits largely empty but will be converted into the HHMI president's house. In addition to the restoration work (discussed below), several changes are required for the house and surrounding grounds to meet the needs of the property's use and contemporary building codes. The applicant compiled a thorough analysis of the building and landscape development which are included with the application materials.

The subject property evolved significantly over the last 200 years. The original brick, five-bay, side gable house is typical of high-style Georgian architecture. Historically, the subject property could be accessed from both Jones Bridge Rd. and Old Brookeville Rd. which is why the north and south elevations are highly decorated and the building has no 'front.' The house maintained several formal gardens that have been altered over time, each with its own internal symmetry.

The area to the east of the house contained the outbuildings necessary to maintain an estate of this size including a carriage house, ice house, agricultural buildings, barns, and quarters for those enslaved on the property. Over time, other buildings were added and demolished (see the attached landscape developmental history) and the Dunlop family was re-interred on site under the existing obelisk to the east of the house.

A portion of the HHMI campus was constructed in the environmental setting of the Hayes Manor and other landscapes and hardscape changes have been made subject to HPC review. The most significant change to the site since it was designated is the 2003 relocation of the 1½ story bungalow from the area immediately to the northeast of the historic house several hundred feet to the north.

In-Kind Replacement and Repairs

Staff finds the proposal to replace the slate and standing seam metal roofs along with new chimney caps is in-kind work that does not require a HAWP. Additionally, cleaning and repairing the historic brickwork does not require a HAWP. The applicant tested several cleaning products (detailed in the application) and will clean the brickwork using the gentlest means possible and following the guidance provided in Preservation Briefs #1 *Cleaning and Water-Repellent Treatments for Historic Masonry Buildings* and #2 *Repointing Mortar Joints in Historic Masonry Buildings*.

Archaeological Investigation

The applicant has conducted archaeological investigations consistent with HP Staff recommendations to identify whether archaeological remains associated with the period of significance for Hayes Manor are present within the anticipated limits of disturbance. Methods employed included pedestrian survey, excavation of shovel test pits, and geophysical survey. Geophysical survey included metal detection and ground penetrating radar (GPR). The applicant provided HP staff with an executive summary report

(attached) detailing the findings. Staff has reviewed the initial archaeological findings and concurs with the interpretations and recommendations for further work made by the archaeology consultant.

The report identifies four areas within the limits of proposed ground disturbance that warrant additional investigations. These investigations would consist of hand-excavated units measuring 3x3 feet, 3 x 5 feet, or 5 x 5 feet as appropriate. Hand-excavated units allow for horizontal exposure and recordation of below-ground archaeological features and systematic collection of associated artifacts.

GPR north of the house identified potential outbuilding foundations near where historical research suggests was the approximate location of a ca. 1817 icehouse. This location could be impacted by proposed tree conservation and construction of the east patio with pergola. The applicant proposes to excavate up to two 3x5-foot test units to expose and document possible foundation features.

GPR identified possible layers of brick and stone pavers adjacent to the entrance porch on the south façade. The applicant proposes to excavate up to two 3x5-foot units in this location that may help document the history and construction of past porch configurations. GPR also identified a possible undocumented outbuilding in the vicinity of the circular drive and associated stormwater management area. STPs recovered architectural debris and a thimble in this area. The applicant proposes to excavate up to three 5x5-foot excavation units to explore the artifact deposit and possible foundation remains.

The final area of interest identified by the archaeological work consists of a concentration of cut nails identified by metal detector survey in the vicinity of proposed stormwater management work along the northern portion of the south drive. These artifacts may be associated with an outbuilding that lacked a substantial foundation. The applicant proposes to excavate up to three 3x3-foot units to identify whether there may have been a structure here.

HP Staff recommends that the proposed archaeological work proceed. Once the proposed archaeological fieldwork is complete, the applicant will consult with staff regarding any further investigations that may be necessary to document or recover significant archaeological features that may be lost to the proposed construction program, or minor adjustments to the work program that would allow significant features to be preserved in place. Once all archaeological fieldwork is finished, the applicant will complete a technical report that documents the archaeological findings.

Site Work

Several modifications are proposed to the existing landscape and hardscape surrounding the house. Staff will address these modifications in the order presented in the application.

#1 - The existing drive to the south of the house is gravel with indefinite edging. The applicant proposes to widen this drive to 13' (thirteen feet) and pave this drive with exposed aggregate concrete. Staff finds that this material will provide a more stable surface while still providing a textured appearance. At the Preliminary Consultation, the HPC was supportive of the new drive. Staff recommends the HPC approve the new south drive and re-engineered turn-around circle.

#4 – The applicant proposes to connect the HHMI campus to the Hayes Manor with an accessible path. The path will be constructed out of cast-in-place concrete with edge curbing. Several sections of the path exceed a 1:12 slope - requiring a handrail - and a simple metal pipe railing will be installed in these sections. The proposed walkway terminates at the new east patio, where there is an accessible entrance to Hayes Manor.

The HPC was supportive of providing additional circulation on the site and understood that railing would be needed in certain locations. Staff finds the serpentine path is identifiable as a new feature and that concrete is the preferred material both from an access and maintenance perspective. Staff finds the grade

in certain locations makes several other preferred materials inappropriate. Staff supports the proposed path under 24A-8(b)(3), (4), and (6).

#5 – On the north side of the house there is a gravel path that leads from the north door through the formal gardens. The path has degraded and is in poor condition. The applicant proposes to install a new raised pathway out of decomposed granite in its place.

Staff finds the existing path has degraded and is unsafe in its current state. Staff finds that the proposed walk will provide a more even surface underfoot while maintaining the appearance of the existing gravel walk. Staff finds the proposed walk is a compatible replacement and recommends the HPC approve the new walkway under 24A-8(b)(1), (3), and (4) and Standard 2.

#6 – The north patio is constructed out of randomly sized stone dry-set pavers. Over the years, the surface has settled and the pavers are uneven and damaged. The applicant proposes to reset the pavers on a new substrate and replace them in-kind, where necessary, in the same footprint. The applicant proposes to re-grade some sections of paving around the house and install new paving.

Staff concurs that the pavers are unsafe and need to be removed and replaced (or at the very least, re-laid on an even substrate). Staff finds this work qualifies as in-kind and does not require a HAWP.

#7 – The site currently has no stormwater management facilities. The applicant will be required to bring those facilities up to code using primarily Environmental Site Design, which utilizes small-scale, non-structural techniques that have characteristics closer to natural runoff conditions. Some re-grading is required to slow the flow of stormwater. A bioretention area is proposed to the southwest of the relocated turn around and two bioswales are proposed along the south edge of the south access drive. These features will be integrated into the landscape and will look like a garden or section of native planning.

Staff finds these proposals will have a minor impact on the character of the site and the proposed plantings are preferable to larger culverts or drywells. Staff also notes that the ground in this location has been disturbed and is unlikely to yield significant archaeological finds. Staff recommends the HPC approve the stormwater management proposal under 24A-8(b)(6).

- #8 On the north side of the garage, the applicant proposes to remove an existing non-historic corrugated metal shed roof that covers a maintenance area. The applicant proposes to maintain the existing perforated brick wall screen to install new mechanical systems and an electric generator. These systems will be obscured from public view by the brick wall. Along the north side of the brick wall, the applicant proposes to construct a graded concrete ramp to provide access to the patio (discussed below). Staff finds the existing shed roof does not contribute to the character of the site and recommends the HPC approve its removal under 24A-8(b)(2).
- #9 Tree Removals. A significant number of trees are proposed for removal to accommodate the proposed alterations. Many of these trees are adjacent to the proposed paths and relocated south drive. Forty-eight trees are prosed for removal which will result in a total of 588.5" (five hundred eighty-eight and a half inches) d.b.h. Of these trees, only 26 (twenty-six) exceed the 6" (six inch) d.b.h. threshold that requires a HAWP before removal. Eighteen additional trees will be impacted by the proposed work, but are not proposed for removal at this time. The county requirements demand the applicant plant at least 147.127" d.b.h. (one hundred forty-seven and one and a half inches) of new trees on the site. Because of the smaller size of the re-plants, the applicant will install up to 49 (forty-nine) new trees that are native to the Mid-Atlantic.

Staff finds that the loss of trees is significant, especially the several trees that exceed 20" (twenty inches) d.b.h. However, Staff also recognizes that proposed interventions on site are intended to have a minimal

impact on the historic house. Staff finds the County requirement is sufficient mitigation and recommends the HPC approve the tree removals and replanting under 24A-8(b)(3) and (6) and Standard 2.

Building Alterations

While most of the work proposed on the house is restorative in nature, several alterations and selective demolition are proposed. To better illustrate the changes proposed to the house, Staff's discussion begins at the south entrance and continues counterclockwise around the house. The discussion will note the item numbers used in the submitted materials.

- #12 On the south elevation, the applicant proposes to recreate the rusticated door surrounding and south porch. Both of these features were recorded in the 1962 HABS documentation. The design of the door surround may date to the house's construction. The south porch most likely dates from sometime between 1792 and 1849 (see 'Manor House Period 2A' in the submitted documentation). Staff finds a historical basis for both of these changes and recommends the HPC approve these changes under 24A-8(b)(1) and Standard 2.
- #2 To the right of the entrance, between the c.1900 east addition and detached garage, there is a c.1980 greenhouse. The applicant proposes to demolish the c.1980 greenhouse. In place of the greenhouse, the applicant proposes constructing an accessible entrance with a wood pergola covered by a metal roof to create a covered breezeway between the structures. The new patio will be covered in bluestones set in mortar. A new garage entrance is proposed that will expand an existing sash window opening and install a solid wood door with a transom. The entrance is down several steps and is flanked by a simply detailed metal railing. Staff finds the greenhouse is clearly not a historic feature, so its demolition should be approved as a matter of course. Staff finds the new feature is mostly transparent, which allows the non-historic garage to read as the later construction it is. Staff additionally finds the proposed wood and metal pergola and bluestone patio are compatible materials. The HPC voiced their support for this work at the Preliminary Consultation and Staff finds the proposal is consistent with Standards 2, 9, and 10 and recommends HPC approve the greenhouse demolition and patio and pergola construction.
- #10 On the north side of the building, there is a section of flat roof that houses three HVAC units. Due to the placement of the HVAC units and their small size, their visibility from the surrounding landscape is minimal. The applicant proposes to construct a louvered penthouse on top of a new platform in the same location. The penthouse measures 62"L \times 38"D \times 36"H (sixty-two inches long, thirty-eight inches deep, and thirty-six inches high) and will be built to match the adjacent sections of the metal roof.

Staff has no concerns about installing the small penthouse as its visibility is so limited. Staff finds matching the penthouse to the adjacent roof is a logical material choice and recommends the HPC approve the penthouse under 24A-8(b)(2) and Standards 2 and 5.

The applicant proposes recreating the rusticated door surround on the north elevation. This door treatment was also documented by HABS in 1962. Staff supports this work and the level of documentation will allow this decorative feature to be accurately re-created. Staff will support the approval of a HAWP for this work.

#3 - Sometime between 1908 and 1962 a sunroom was added to the west of the historic building. The sunroom stairs do not have a landing that satisfies the current building code and several of the treads are cracked and/or displaced. The applicant proposes to remove the bluestone stairs and expand a brick landing on the north and south elevations. The applicant proposes expanding the north patio to the west. The patio wraps around the west side of the sunroom where the applicant proposes to grade the patio to create an on-grade entrance to the sunroom. Because the interior of the Hayes Manor does not provide universal access, this graded paving is necessary to provide an accessible entrance to the sunroom.

The HPC supported the additional paving proposed at the Preliminary Consultation and requested measured drawings (provided) to compare the existing and proposed paving. Staff finds the additional paving will not overwhelm the character of the house and recommends the HPC approve the new stairs and patio.

#11 – To support the mechanical equipment in the attic, the applicant proposes removing three attic windows and installing new louvers in the openings. This is an increase in the number of louvers from the two that were presented at the Preliminary Consultations. To conceal the louvers, the applicant proposes to install a sash unit without glazing in front of the louver.

Additional louvers are proposed for the west gable end of the historic house and two additional louvers are proposed for the garage (one on the east wall and another on the north wall). These three louvers will match the color of the brick to reduce their visual impact.

Staff finds utilizing the attic window openings for ventilation is an appropriate solution that will minimize the impact on the historic fabric. Additionally, Staff finds installing empty sashes in the window openings will reduce the visibility of the louvers and recommends the HPC approve the attic louvers under 24A-8(b)(2).

Staff additionally supports installing the three additional louvers. The louver proposed for the west wall will penetrate a section of the house that dates to c.1908. While this section of the house is significant to the evolution of Hayes Manor, it was constructed more than a century after the historic core. Staff finds the proposed louvers in the garage are appropriate because it dates from the mid-20th century and is an accessory structure that can allow for more extensive alterations. Staff recommends the HPC approve the additional three louvers under 24A-8(b)(2) and (6).

#15 – Window Sash Replacement. All of the windows are 20th-century replacements and are in a variety of conditions and configurations as detailed in the application. The applicant proposes to remove the aluminum storm windows and all of the existing single-pane TDL wood sashes and the parting bead. In place of the existing sashes, the applicant proposes to install jamb liners and new double-glazed wood SDL sashes in matching configurations. The new sashes will maintain the profiles of the existing windows.

Staff concurs with the applicant that the existing sashes are not the original 18th-century sashes and may be removed. Staff also finds that the proposed double-glazed wood sashes are an appropriate replacement. Staff has an outstanding concern regarding the replacement with SDL windows and with the construction of the proposed jamb liners. The Hayes Manor is perhaps the finest Georgian-style building in the County. SDLs while utilized extensively in historic districts, can still present a somewhat flimsy appearance when used in large sashes. The applicant should replace the windows with new TDL windows. If the applicant were not a non-profit organization and exempt from County Property Taxes, replacing the existing sashes with new TDL sashes would be eligible for the tax credit. Additionally, based on past experience, jamb liners frequently have exposed vinyl elements that are incompatible with traditional building materials. Staff recommends the HPC approve the new windows under 24A-8(b)(2) and Standard 2 but add a condition for approval that the applicant needs to submit detailed specifications about the jamb liners to Staff for review and approval before permit drawings are reviewed and approved.

Associated with the window replacements, the applicant proposes to install wood shutters with metal hinges and shutter dogs. Wood shutters were documented in the HABS photographs, so there is a historical basis for the installation. Staff recommends the HPC approve the new shutters under 24A-8(b)(1).

STAFF RECOMMENDATION

Staff recommends the HPC approve the HAWP with four (4) conditions:

- 1. The proposed replacement windows shall be true-divided light (TDL) windows. The applicant shall submit detailed specifications to Staff for final review and approval before permit drawings can be approved.
- 2. The applicant shall submit detailed specifications for the proposed jamb liners to Staff for final review and approval before permit drawings can be approved.
- 3. The applicant shall proceed with their recommended fieldwork as detailed in this HAWP submission, and shall consult with staff regarding any further investigations that may be necessary to document or recover significant archaeological features that may be lost to the proposed construction program, or to discuss minor adjustments to the work program that would allow significant features to be preserved in place.
- 4. After consulting with staff, the applicant may proceed with any additional proposed archaeological fieldwork, if necessary. Once the fieldwork is complete, and prior to approval of the building permit, the applicant shall complete a technical report that documents the archaeological findings and submit the report to Staff;

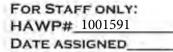
under the Criteria for Issuance in Chapter 24A-8(b)(1), (2), (3), (4), and (6) having found that the proposal will not substantially alter the exterior features of the historic resource and is compatible in character with the district and the purposes of Chapter 24A;

and with the Secretary of the Interior's Standards for Rehabilitation #2, 9, and 10;

and with the general condition that the applicant shall present an electronic set of drawings, if applicable, to Historic Preservation Commission (HPC) staff for review and stamping prior to submission for the Montgomery County Department of Permitting Services (DPS) building permits;

and with the general condition that final project design details, not specifically delineated by the Commission, shall be approved by HPC staff or brought back to the Commission as a revised HAWP application at staff's discretion;

and with the general condition that the applicant shall notify the Historic Preservation Staff if they propose to make **any alterations** to the approved plans. Once the work is completed the applicant will contact the staff person assigned to this application at 301-563-3400 or dan.bruechert@montgomeryplanning.org to schedule a follow-up site visit.





APPLICATION FOR HISTORIC AREA WORK PERMIT HISTORIC PRESERVATION COMMISSION 301.563.3400

APPLICANT:				
Name: c/o Robert "OB" Obrist	E-mail: obristr@hhmi.org			
Name.				
Address: 4000 Jones Bridge Road	City: Chevy Chase, MD Zip: 20815			
Daytime Phone: (301) 215-8608	Tax Account No.: 00425422			
AGENT/CONTACT (if applicable):				
Name: c/o Susan Pommerer, AIA - Principal	E-mail: susan.pommerer@smithgroup.com			
Address: 1700 New York Avenue NW, Suite 100	City: Washington, DC Zip; 20006			
Daytime Phone: (202) 974-0847	Contractor Registration No.: TBD			
LOCATION OF BUILDING/PREMISE: MIHP # of	fistoric Property35/10			
Is the Property Located within an Historic District	Yes/District Name X No/Individual Site Name_Hayes Manor			
Is there an Historic Preservation / Land Trust / Envi	ronmental Easement on the Property? If YES, include a			
(Conditional Use, Variance, Record Plat, etc.?) If Y supplemental information.	rovals / Reviews Required as part of this Application?			
Town/City: Chevy Chase, MD Neares	t Cross Street: Connecticut Avenue			
Lot: 7 Block: 26 Subdiv	sion: Manor Parcel: B Plat No. 23792			
TYPE OF WORK PROPOSED: See the checklist for proposed work are submitted with this a be accepted for review. Check all that apply: New Construction Deck/Porch Addition Fence Demolition Grading/Excavation Roof	Shed/Garage/Accessory Structure Solar Tree removal/planting			
I hereby certify that I have the authority to make and accurate and that the construction will com	the foregoing application, that the application is correctly with plans reviewed and approved by all necessary			
	is to be a condition for the issuance of this permit.			
Susan Pommerer	November 16, 2022			
Signature of owner or authorized agen	Date			



FOR STAFF ONLY: HAWP# 1001591 DATE ASSIGNED_

APPLICATION FOR HISTORIC AREA WORK PERMIT HISTORIC PRESERVATION COMMISSION 301.563.3400

APPLICANT:

	E-mail: obristr@hhmi.org
Address: 4000 Jones Bridge Road	City: Chevy Chase, MD Zip: 20815
Daytime Phone: (301) 215-8608	Tax Account No.: 00425422
AGENT/CONTACT (if applicable):	
Name: c/o Susan Pommerer, AIA - Principal	E-mail: susan.pommerer@smithgroup.com
Address: 1700 New York Avenue NW, Suite 100	City: Washington, DC Zip: 20006
Daytime Phone: (202) 974-0847	Contractor Registration No.: _TBD
LOCATION OF BUILDING/PREMISE: MIHP # of His	storic Property35/10
Is the Property Located within an Historic District?	Yes/District Name X_No/Individual Site Name_Hayes Manor
2016 Final Forest Conservation Plan and 1999 & 2002 Ea Are other Planning and/or Hearing Examiner Appro (Conditional Use, Variance, Record Plat, etc.?) If YES supplemental information.	vals / Reviews Required as part of this Application?
Building Number: 35/10 Street: 4	1101 Manor Road
	Cross Street: Connecticut Avenue
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Town/City: Chevy Chase, MD Nearest Cot: 7 Block: 26 Subdivision TYPE OF WORK PROPOSED: See the checklist of	Cross Street: Connecticut Avenue Hayes on: Manor Parcel: B Plat No. 23792 on Page 4 to verify that all supporting items
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Town/City: Chevy Chase, MD Nearest Clot: 7 Block: 26 Subdivision TYPE OF WORK PROPOSED: See the checklist of for proposed work are submitted with this apply be accepted for review. Check all that apply: New Construction Deck/Porch Addition Fence Addition Hardscape/La Grading/Excavation X Roof I hereby certify that I have the authority to make the and accurate and that the construction will comply agencies and hereby acknowledge and accept this	Cross Street: Connecticut Avenue Hayes on: Manor Parcel: B Plat No. 23792 In Page 4 to verify that all supporting items plication. Incomplete Applications will not Shed/Garage/Accessory Structure Solar Tree removal/planting Mindow/Door Other: The foregoing application, that the application is correctly with plans reviewed and approved by all necessary
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HAWP APPLICATION: MAILING ADDRESSES FOR NOTIFYING

[Owner, Owner's Agent, Adjacent and Confronting Property Owners]

Owner's Mailing Address:	Owner's Agent Mailing Address:
Howard Hughes Medical Institute	SmithGroup
c/o Mr. Robert "OB" Obrist	c/o Susan Pommerer
4000 Jones Bridge Road	1700 New York Avenue NW, Suite 100
Chevy Chase, MD 20815	Washington, DC 20006
Adjacent and Confronting Property Owners	Mailing Addresses:
Allen M. Hutter	SUNA SEO
3905 Jones Bridge Rd.	TIMOTHY Y SEO
Chevy Chase, MD 20815	3909 Jones Bridge Rd.
Tax Acct. No. 07-00671492 Lot 5 Block 1	Chevy Chase, MD 20815
	Tax Acct. No. 07-00671388 Lot 7 Block 1
Jana L. Mason, Trustee	IAN LEE
The Jana L. Mason Trust	AMANDA LEE
P. O. Box 15126	8801 Spring Valley Rd.
Chevy Chase, MD 20825	Chevy Chase, MD 20815
Tax Acct. No. 07-02850862 Lot 8 Block 1	Tax Acct. No. 07-00670910 Lot 9 Block 1
Nancy C. Wong	MICHAEL LEO FLANAGAN
8800 Connecticut Ave.	JACQUELINE LANEZ FLANAGAN
Chevy Chase, MD 20815	8801 Kensington Pkwy
Chevy Chase, MD 20815	Chevy Chase, MD 20815
Tax Acct. No. 07-02645803 Lot P15 Block 1	Tax Acct. No. 07-00526446 Lot P3, Pt Lt 4 Block 1
Sakineh Zarakhtar et. al.	Chevy Chase Land Co.
8800 Spring Valley Rd.	5471 WISCONSIN AVE # 320
Chevy Chase, MD 20815	Chevy Chase, MD 20815
Tax Acct. No. 07-00671561 Lot 1 Block 7	Tax Acct. No. 07-00466741 Lot 1-6 Block 22
Chevy Chase Land Co.	MARY ELLEN MURPHY
5471 WISCONSIN AVE # 320	8514 Lynwood Pl.
Chevy Chase, MD 20815	Chevy Chase, MD 20815
Tax Acct. No. 07-00466785 Lot 7-12 Block 22	Tax Acct. No. 07-00466923 Lot 13 Block 24
Kitty C. Barry Revocable Trust	JULIAN E GILLESPIE
4004 Manor Rd.	HEATHER A GILLESPIE
Chevy Chase, MD 20815 Tax Acct. No. 07-00467255 Lot 5 Block 24	8519 Longfellow Place
1 AA ACCC. NO. 07-00407233 LOC 3 DIOCK 24	Chevy Chase, MD 20815 Tax Acct. No. 07-00467142 Lots P3 & 4 Block 24
JORGE F. CHAMOT	
	VINCENZO SALINA AMORINI BOLOGNINI 8515 Lynwood
ALLISON ARIAS	
3904 Manor Rd.	Chevy Chase, MD 20815 Tax Acct, No. 07-00466706 Lots P7 & 8 Block 25
Chevy Chase, MD 20815	1 dx Acct. No. 07-00466706 LOTS P7 & 8 BIOCK 25
Tax Acct. No. 07-00467290 Lot 9 Block 25	Daniel C Coldhara 9 Marian K Caldhara
Joan N. Pickett Tr.	Daniel S. Goldberg & Marion K. Goldberg
3719 Village Park Dr.	8616 Village Park Pl.
Chevy Chase, MD 20815	Chevy Chase, MD 20815
Tax Acct. No. 07-03028066 Lot 10 Block A	Tax Acct. No. 07-03028077 Lot 11 Block A
Steven I. & W.E. Silver LIVING TRUST	Robert H. & A.N. Thompson
3713 Village Park Dr.	3715 Village Park Dr.
Chevy Chase, MD 20815	Chevy Chase, MD 20815
Tax Acct. No. 07-03028033 Lot 7 Block A	Tax Acct. No. 07-03028044 Lot 8 Block A

JOHN J KEELING	ALEXANDER V ILYASOV			
PATRICIA MONTILLA-KEELING	MARY GRACE TABAKIN			
3717 Village Park Dr.	3709 Village Park. Dr.			
Chevy Chase, MD 20815	Chevy Chase, MD 20815			
Tax Acct. No. 07-03028055 Lot 9 Block A	Tax Acct. No. 07-03028000 Lot 5 Block A			
Jacqueline R. Knepshield	CHARLES J FASELIS			
REVOCABLE TRUST	DOMINIQUE HOWARD			
3711 Village Park Dr.	8617 Village Park Pl.			
Chevy Chase, MD 20815	Chevy Chase, MD 20815			
Tax Acct. No. 07-03028011 Lot 6 Block A	Tax Acct. No. 07-03028215 Lot 1 Block B			
Sukhjit S. Sidhu & Jagdisk K Sidhu	NANCY A RYAN REVOC TR			
3803 Village Park Dr.	3805 Village Park Dr.			
Chevy Chase, MD 20815	Chevy Chase, MD 20815			
Tax Acct. No. 07-03028226 Lot 2 Block B	Tax Acct. No. 07-03028237 Lot 3 Block B			
Aida T. Jarkas	Chevy Chase Park Community Association			
3804 Village Park Dr.	c/o Management Group Associates			
Chevy Chase, MD 20815	20440 Century Blvd., Suite 100 Germantown, MD 20874			
Tax Acct. No. 07-03028294 Lot 13 Block C	Tax Acct. No. 07-03028022 Parcel C Block C			
Chevy Chase Park Community Association	Chevy Chase Park Community Association c/o			
c/o Management Group Associates	Management Group Associates			
20440 Century Blvd., Suite 100	20440 Century Blvd., Suite 100			
Germantown, MD 20874	Germantown, MD 20874			
Tax Acct. No. 07-03028088 Parcel E Block C	Tax Acct. No. 07-03028306 Part of Parcel G Block C			
Dennis W. Schraf, Sr. & H.M. Schraf	David F. Hodge, Jr. & P.J. Hodge			
8812 Platt Ridge Rd.	8810 Platt Ridge Rd.			
Chevy Chase, MD 20815	Chevy Chase, MD 20815			
Tax Acct. No. 07-02829488 Lot 1	Tax Acct. No. 07-02829490 Lot 2			
CHEVY CHASE HOUSE TR	Jerome K. & A.R. Blask			
8806 Platt Ridge Rd.	8804 Platt Ridge Rd.			
Chevy Chase, MD 20815	Chevy Chase, MD 20815			
Tax Acct. No. 07-02829513 Lot 4	Tax Acct. No. 07-02829524 Lot 5			
Mojdeh & Nazir A. Waroich	Columbia County Club			
8808 Platt Ridge Rd.	7900 Connecticut Ave.			
Chevy Chase, MD 20815	Chevy Chase, MD 20815			
Tax Acct. No. 07-02829502 Lot P3	Tax Acct. No. 07-03580358 N355, Parcel B			
HOWARD HUGHES MEDICAL INSTITUTE	Sara G. & M. H. Dent			
4000 Jones Bridge Rd.	30 7th St E., Suite 2000			
Chevy Chase, MD 20815	Saint Paul, MN 55101			
Tax Acct. No. 07-03851725 Parcel N976, Lot 6	Tax Acct. No. 07-00425661 Parcel P319			
Maryland-National Capital Park & Planning Comm.	VINCENT HORVILLE			
2425 Reedie Drive	4021 JONES BRIDGE ROAD			
Wheaton, MD 20902	Chevy Chase, MD 20815			
Tax Acct. No. 07-00428607 Parcel P806	Tax Acct. No. 07-00419272 Parcel P912			
GREGORY BAYTLER	BENJAMIN D CLARK			
TATYANA BAYTLER	SOSHANA L CLARK ET AL			
15837 CRABBS BRANCH WAY #A	4003 Jones Bridge Rd.			
	Chevy Chase, MD 20815			
ROCKVILLE, MD 20855	Tax Acct. No. 07-00426756 Parcel P928			
Tax Acct. No. 07-00419283 Parcel P913 BA B2 RESIDENTIAL LLC	CHEVY CHASE B2 REATIL LLC			
6406 IVY LANE SUITE 700	6406 IVY LANE SUITE 700			
GREENBELT, MD 20770	GREENBELT, MD 20770			
Tax Acct. No. 07-03824436 UNIT B2 RES	Tax Acct. No. 07-03824447 PUNIT B2 RETAIL			

Description of Property:

Please describe the building and surrounding environment. Include information on significant structures, landscape features, or other significant features of the property:

The Hayes Manor was built ca. 1767 in the Georgian style, consisting of two and a half stories above grade with a below grade basement in a four square configuration. The east wing, consisting of two stories plus a basement, was added in 1899 and the west wing (sun porch addition) and garage were constructed in 1908. A greenhouse connecting the garage to the east wing is thought to have been built in the 1960's. Exterior walls are of solid brick construction and floors are primarily wood-framed. The property is located on the grounds of the Howard Hughes Medical Institute (HHMI) Campus at 4000 Jones Bridge Rd in Chevy Chase, Maryland. The historic structure is approximately 9,000 SF and was documented by the Historic American Building Survey (HABS) in 1962.

In 1984 Hayes Manor was included in the Montgomery County Master Plan for Historic Preservation and was deemed significant under Criteria 1.a, 1.d, and 2.a of the Montgomery County Preservation Ordinance as having significant cultural characteristics of the county/state/nation, exemplifying historic heritage of the community and representing architectural and design significance of a particular period. HHMI purchased the property in 2002 from the Columbia Foundation and the building has for the most part remained vacant since that time.

Hayes Manor is located on approximately 9.44 acres, a small portion of an original tract of land purchased by Alexander Williamson in 1762. The area north of the residence includes landscape gardens, pea gravel pathways, and a guest house. A loop road through the HHMI headquarters campus provides access to campus facilities. Access to Hayes Manor is provided by way of a driveway connecting to the southern end of the loop road. The driveway is asphalt but transitions to gravel near the residence.

Hayes Manor is surrounded by stately, mature walnut, hickory, and oak trees, boxwood garden, and a bowling green. Research has been completed to understand the developmental history of the house and surrounding landscape.

Description of Work Proposed:

Please give an overview of the work to be undertaken:

In early 2021 SmithGroup was hired by HHMI to provide an updated Master Plan for the HHMI Campus that included an evaluation of the future use of Hayes Manor. As part of that process, it was determined that Hayes Manor could be utilized as a residence for the HHMI President and could also support events and receptions while retaining the historic character of the structure. In addition to meeting the functional programmatic needs, the rehabilitation scope will include improvements to accessibility, life-safety, building infrastructure, and deferred maintenance necessary to make this a serviceable and code-compliant structure.

The proposed plan repurposes the house with meeting and entertainment spaces on the first floor with the President's residence on the second floor. The first floor of the main house and the west sunroom will be converted to flexible reception space. The east wing of the first floor will include a meeting/dining room and a residential kitchen which will be served and supported by the main kitchen in the headquarters building. New accessible entrances will be provided into the house and onto a rehabilitated east patio located between the House and the Garage.

The second floor of the House will become the President's private residence. The plan will feature two bedrooms with ensuite bathrooms, a large living and dining room, a modern eat-in kitchen, two offices, and a laundry/ guest bathroom. The second floor is approximately 3,000 gross square feet offering modern living in a historic structure.

In addition to the building renovations, the Owner intends to make improvements to the on-campus circulation system directly related to access to the Hayes Manor to improve accessibility and stormwater management per county regulations. The scope of the renovation extends to patios, gardens, and landscape areas around the residence. New retaining walls are proposed to extend the outdoor lawn area and address the grade change between the area north of the residence and the loop road.

The project scope includes providing an ADA accessible route from existing HHMI headquarters campus buildings to Hayes Manor; both to the interior of the residence as well as exterior amenity areas. The ADA route begins from an exterior plaza on the east side of the loop road. The elevation of this plaza is lower than the loop roadway so a series of ramps with handrails and landings are proposed. After crossing the loop road, the ADA route will continue west to connect to the new east patio and the residence. The material of the ADA route will be concrete. All ramps will be designed to meet Americans with Disabilities Act (ADA) requirements and are not-to-exceed 12:1 slope. All areas with slopes exceeding 5% shall have metal handrails.

Stormwater management (SWM) for the development area must be provided in accordance with State and County requirements. SWM requirements for development within the County are defined by Chapter 19 of the Montgomery County code. Environmental Site Design (ESD) practices will be used to treat runoff from the proposed development. The Code defines ESD as using small scale SWM practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics to minimize the impact of land development on water resources.

The design of the site and landscape surrounding Hayes Manor seeks to create a landscape that complements the historic character of the building and grounds as well as the Institute's contemporary campus. The landscape shall address several important missions at once: to provide a useful and relaxing residential environment for the President and family; a direct and accessible pedestrian connection between the headquarters building and the residence typified by intuitive and comfortable wayfinding; and a welcoming environment for invited visitors that can support private, catered events. Open spaces will be designed and assessed for their fit into, and enhancement of, the historic landscape quality and the overall campus landscape framework.

Site plantings will include deciduous shade trees, evergreen trees, flowering understory trees, mixed shrubs, ornamental grasses, perennials and annuals, groundcovers and lawn. Exposed areas within plant beds are to be mulched, and all planted areas will be irrigated. Large deciduous shade trees will typically be specified at 5" caliper, depending on species and availability. All plantings will be specified for American Nursery Stock Standards.

Pedestrian walkways will typically be cast-in-place concrete with finishes and coloring consistent with sidewalks elsewhere on the campus. Vehicular areas will typically be asphalt orseeded aggregate concrete closer to the historic entries. Select areas will have enhanced paving materials: bluestone pavers, mortar set, for all patio spaces around the house and

garage, and select walkways as noted in the plan. At the driveway entry court, bluestone pavers with be set on a concrete base and seeded cast-in-place concrete for select walkways and the driveway sections closest to the house. Driveway edges and bands are to be stone cobbles (aka Belgian block) and mortar set.

Site retaining walls shall be constructed to be seamless continuations of the existing walls and be constructed of matching stone. Stairs shall match the materials and general design of existing site stairs on campus, with bluestone treads and fieldstone risers.

Organization of Application:

This application for a Historic Area Work Permit (HAWP) is organized in parts to differentiate between site improvements and exterior building improvements.

SITE IMPROVEMENTS

Work Item #1: South Drive

Work Item #2: East Patio with Pergola

Work Item #3: West Patio and Sunroom Steps

Work Item #4: Accessible Pathway

Work Item #5: North Walkway
Work Item #6: North Patio Repair

Work Item #7: Stormwater Management Infrastructure

Work Item #8: Mechanical Enclosure Work Item #9: Tree Conservation Plan

EXTERIOR BUILDING IMPROVEMENTS

Work Item #10: Rooftop Mechanical Penthouse & Condenser

Work Item #11: Mechanical Louvers

Work Item #12: South Porch & Rusticated Surround at North and South Door

Work Item #13: Roofing Replacement
Work Item #14: Brick Masonry Restoration

Work Item #15: Window Sash Replacement

This application also includes a series of appendices to reference applicable information related to ongoing archaeological investigations and material specifications. This includes the following:

Appendix A: Executive Summary on Archaeological Investigations at Hayes Manor,

Montgomery County, Maryland

Appendix B: Slate Shingle Roofing, Flat Seam Roofing, and Chimney Cap Draft Specifications

Appendix C: Masonry Cleaning and Repointing Draft Specifications

SITE IMPROVEMENTS

OVERALL SITE PLAN

The site plan provided here serves as a location map to identify all site improvements proposed at Hayes Manor. Each Work Item is listed below and detailed on the following pages.

In support of the proposed site improvements, SmithGroup has engaged the services of Gray & Pape to complete archaeological investigations required by Montgomery County. An executive summary of that process to date is provided in Appendix A.

Work Item #1: South Drive

Work Item #2: East Patio with Pergola

Work Item #3: West Patio and Sunroom Steps

Work Item #4: Accessible Pathway

Work Item #5: North Walkway

Work Item #6: North Patio Repair

Work Item #7: Stormwater Management Infrastructure

Work Item #8: Mechanical Enclosure

Work Item #9: Tree Conservation Plan



SITE IMPROVEMENTS

WORK ITEM #1:

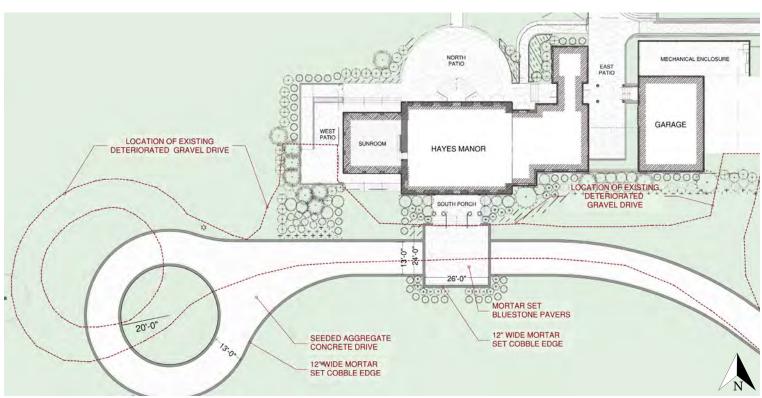
SOUTH DRIVE

Description of Current Condition: An existing gravel drive is located along the south facade of Hayes Manor leading to a gravel turnaround located southwest of the Sunroom.

Proposed Work: The existing gravel drive will be replaced by a seeded aggregate concrete drive with mortar set bluestone cobble edge. The existing gravel turnaround will be replaced by a similar seeded aggregate concrete drive. The location of the vehicular turnaround has been moved to the east and south to avoid further impact to existing trees.



Existing granite drive located south of the Manor House.



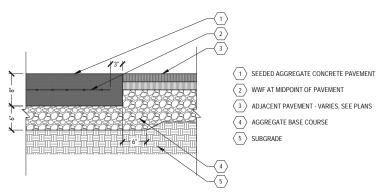
Proposed South Drive and vehicular turnaround. Location of existing granite drive noted by the red dashed line.



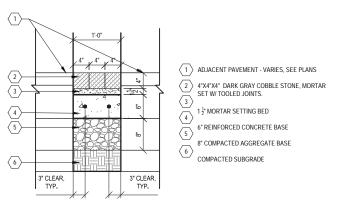
Existing granite drive located south of the Manor House.



Design precedent of seeded aggregate concrete drive with cobble edge band.



Seeded aggregate concrete pavement detail.



Cobble edge band detail.

WORK ITEM #2:

EAST PATIO WITH PERGOLA

Description of Current Condition:

The existing greenhouse (constructed in the 1980s) located between the Manor House and the Garage is in poor condition. The east plaza between the Manor House and the garage features a damaged trellis which is not structurally stable.

Proposed Work:

The existing greenhouse will be demolished, and a new East Patio will provide accessibility to the Manor House. A new wood pergola roof with a flat seam metal roof will be constructed between the Garage and the Manor House to provide a covered connection between the structures at the new accessible entry. This pergola will feature classical columns and pitched wood framed roof structure to align with the architectural character of the Manor House.



PART ANTO PRINNER WELLESTARE
POWERS SET A AGRICUA POLICY
ACCESSABLE PATHON FROM
PRINCE CONCRETE SLAS WITH CURB

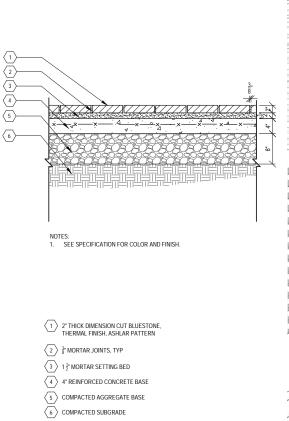
PART POLICY
ACCESSABLE PATHON FROM
PRINCE CONCRETE SLAS WITH CURB

PART PATHON SECONDARY
READ CONCRETE SLAS WITH CURB

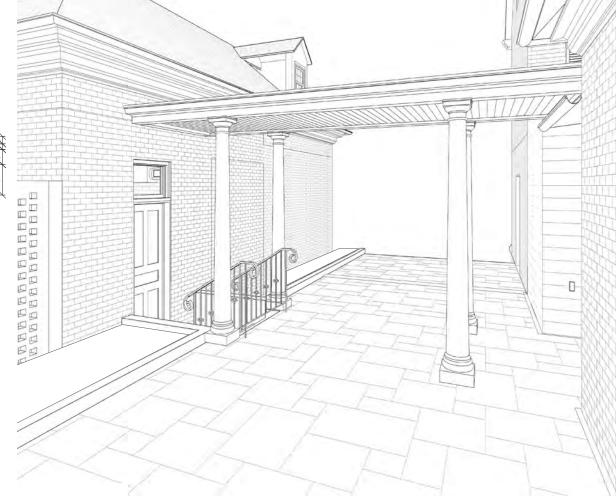
PART PATHON SECONDARY
RECHANICAL ENCLOSURE
COLLIN SUPPROTISOR OF MORNING PRINCE
PATHON
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COLLIN SUPPROTISOR OF MORNING PRINCE
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Design precedent of bluestone paving

Design precedent of bluestone paving



Mortar set bluestone paving detail

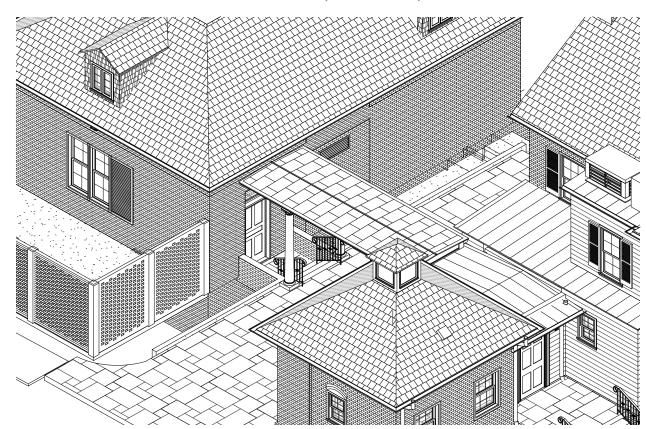


Perspective view of East Patio from north

Enlarged plan of East Patio

WORK ITEM #2:

EAST PATIO WITH PERGOLA (CONTINUED)



Bird's eye view of East Patio with Pergola



Existing window in northwest corner of garage to be modified to create new entry door.



Perspective view of new Garage entry door from Manor House accessible entry.

WORK ITEM #3:

WEST PATIO AND SUNROOM STEPS

Description of Current Condition:

Existing bluestone and brick steps outside the French doors along the north, west, and south facades of the Sunroom do not provide the minimum landing at an exterior threshold per code. The existing stone treads are also cracked and displaced, causing a safety hazard.

Proposed Work:

The proposed scope of work will extend the brick steps out to provide the minimum landing. An extended plaza will be provided at the west elevation to provide an accessible entry into the sunroom from the North Patio.

The proposed design includes extensions of the steps on the north and south facades to connect to a new west patio. The proposed patio will project west from the facade of the Sunroom by approximately 18 feet to avoid further impact to existing trees in the vicinity. The design includes a sloped pathway along the north and west sides at an incline less than 1:20 to provide an accessible route from the North Patio to the Sunroom. The perimeter will be finished in a low curb with select regarding to avoid use of railings and guardrails.



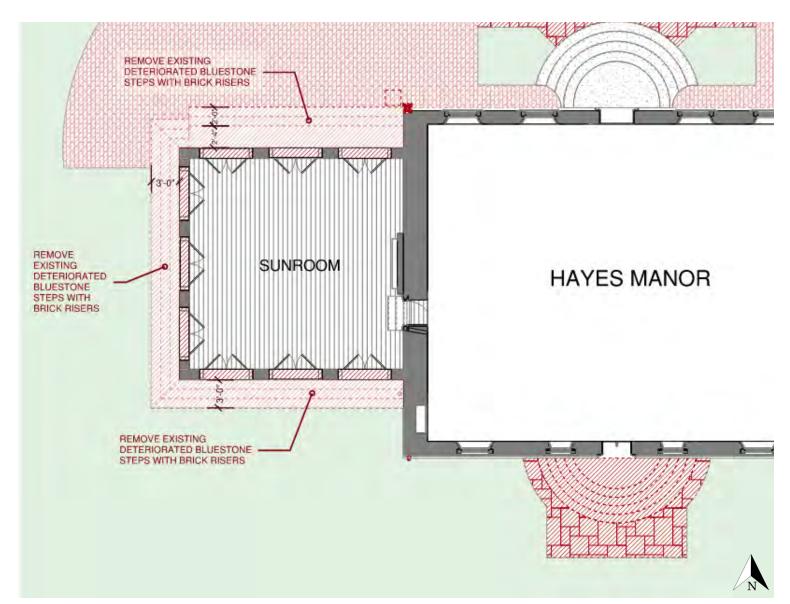
Existing condition of stone steps outside Sunroom.



Existing condition of stone steps outside Sunroom.



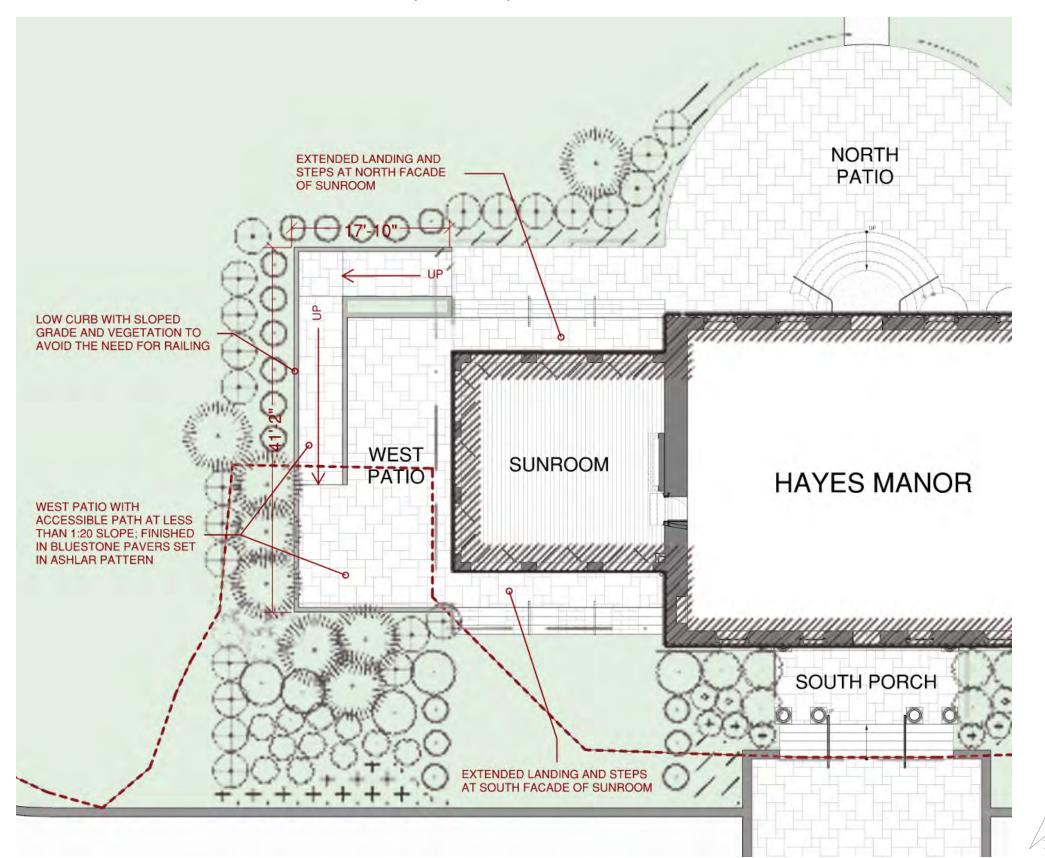
Existing condition of stone steps outside Sunroom.



Enlarged plan of existing Sunroom with perimeter steps

WORK ITEM #3:

WEST PATIO AND SUNROOM STEPS (CONTINUED)



Enlarged plan of West Patio along west side of Sunroom

WORK ITEM #4:

ACCESSIBLE PATHWAY

Description of Current Condition: The site does not include any accessible pathway connecting the headquarters building to Hayes Manor.

Proposed Work: The existing site improvements will include an accessible pathway from the headquarters building to a new East Patio at Hayes Manor. An accessible entry into the residence will be provided from the East Patio. Additional accessible pathways and ramps will connect the exterior site areas, including the North and West Patios and driveway adjacent to the Garage, to the residence.

The proposed accessible pathway from the headquarters building to Hayes Manor will be constructed of cast-in-place concrete with an edge curbing. Several areas of the accessible path will includes ramps at a slope of 1:12 which will require handrails.

WORK ITEM #5:

NORTH WALKWAY

Description of Current Condition: The existing pathway leading from the North Patio towards the Platt House and past the Rose Garden is unstable and in poor condition. This existing pathway is difficult to traverse and needs to be replaced.

Proposed Work: The existing pathway will be replaced in its existing location with a decomposed granite pathway of a similar width and footprint. The pathway will be slightly elevated from the adjacent grade to limit excavations which may impact nearby trees.

WORK ITEM #6:

NORTH PATIO REPAIRS

Description of Current Condition: The existing walkways and patios do not provide adequate access and slopes for an accessible route, and the existing dry set bluestone pavers are damaged and uneven.

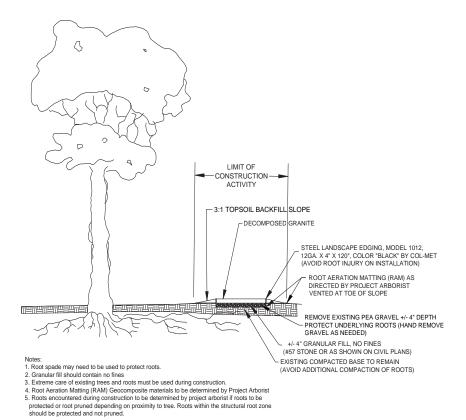
Proposed Work: The existing bluestone pavers will be reset to improve walking conditions and to provide accessible access and entry into the Manor House.



Existing pea gravel pathway north of Manor House.

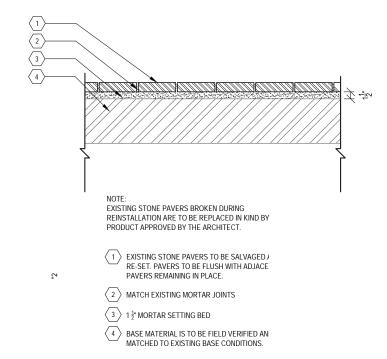


Existing bluestone pavers located in the North Patio.



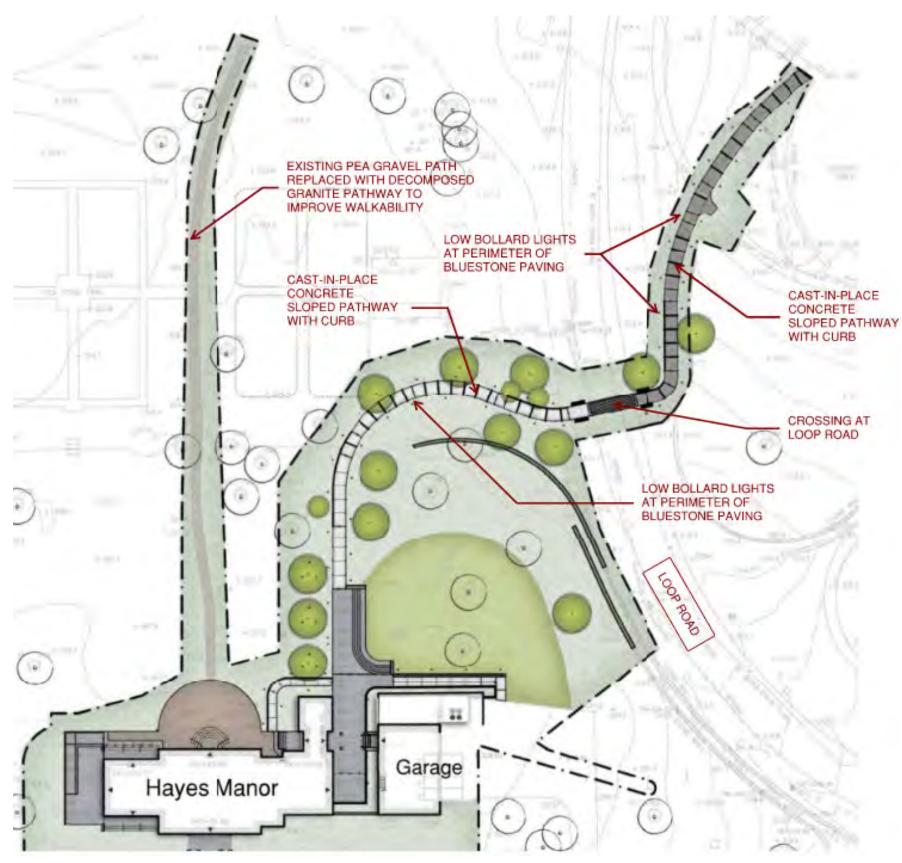
RAISED PATH

Decomposed granite raised pathway to replaced pea gravel pathway north of Manor House.



Restoration detail for mortar set bluestone pavers in North Patio.

WORK ITEM #5: ACCESSIBLE PATHWAY & WORK ITEM #6: NORTH WALKWAY (CONTINUED)



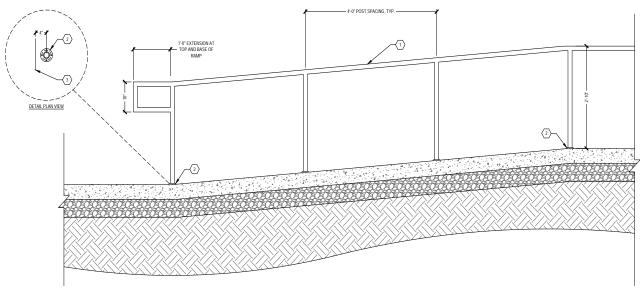
Partial site plan locating improvements north of the Manor House to include an accessible pathway from the headquarters, a decomposed granite pathway to the north, and repaired bluestone paving at the North Patio.



Precedent design of decomposed granite raised pathway to replace pea gravel pathway north of Manor House.



Precedent design of cast-in-place concrete pathway to serve as accessible walk from headquarters building to the Manor House.



Square galvanized steel rail w/ matte bronze finish along accessible ramp.

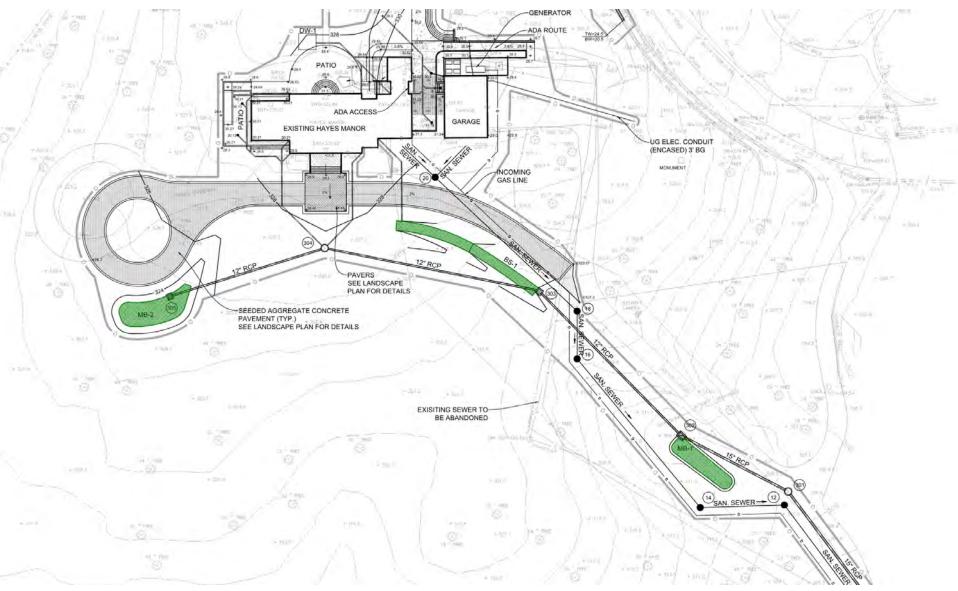
WORK ITEM #7:

STORMWATER MANAGEMENT INFRASTRUCTURE

Description of Current Condition: There is no stormwater management infrastructure present at the site immediately surrounding Hayes Manor. The HHMI Headquarters campus includes the required infrastructure related to the headquarters building(s) located elsewhere on site, but it is not serving this area.

Proposed Work: Stormwater management (SWM) for the development area will be provided in accordance with State and County requirements. SWM requirements for development within the County are defined by Chapter 19 of the Montgomery County code. Environmental Site Design (ESD) practices will be used to treat runoff from the proposed development. The Code defines ESD as using small scale SWM practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics to minimize the impact of land development on water resources.

To serve the anticipated needs of this site as required per the proposed development a bio-retention area is proposed along the western edge of the access drive from Manor Road. This will occur in a previously disturbed area of the site and will be integrated with the surrounding landscape.



Partial site plan locating required bioretention areas.



Design precedent of required bio-retention plantings.



Design precedent of required bio-retention plantings.



Design precedent of required bio-retention plantings.



Design precedent of required bio-retention plantings.

WORK ITEM #8:

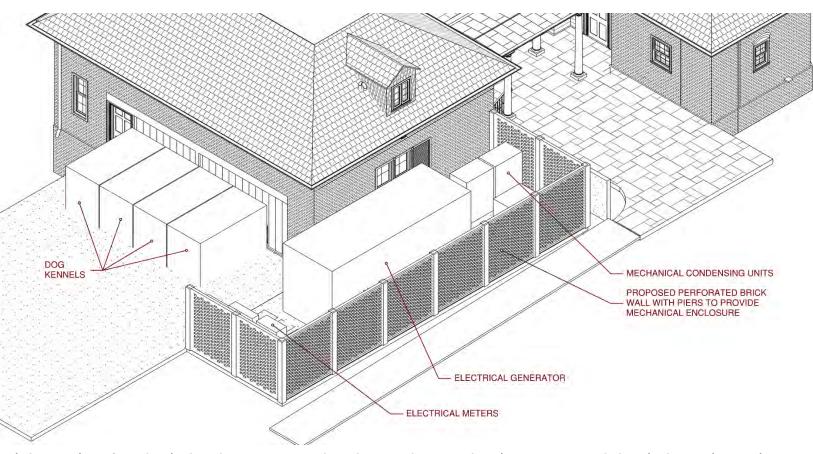
MECHANICAL ENCLOSURE

Description of Current Condition: The area north of the garage is used for equipment and material storage. This area is covered by a shed roof clad in corrugated fiberglass roofing.

Proposed Work: Maintenance equipment, material storage, and the existing shed roof structure will be removed. A new site brick site wall will be constructed to conceal mechanical equipment, an electrical generator, and the electrical meter to be located at grade along the north side of the garage. A new accessible ramp to the residence from the existing driveway will be located along the north side of the Garage.



Existing maintenance storage area along north wall of garage, covered by shed roof structure.



Bird's eye view of mechanical enclosure to conceal outdoor condensers, electric generator, and electrical metering equipment.



Design precedent of perforated brick screen wall.



Design precedent of perforated brick screen wall.

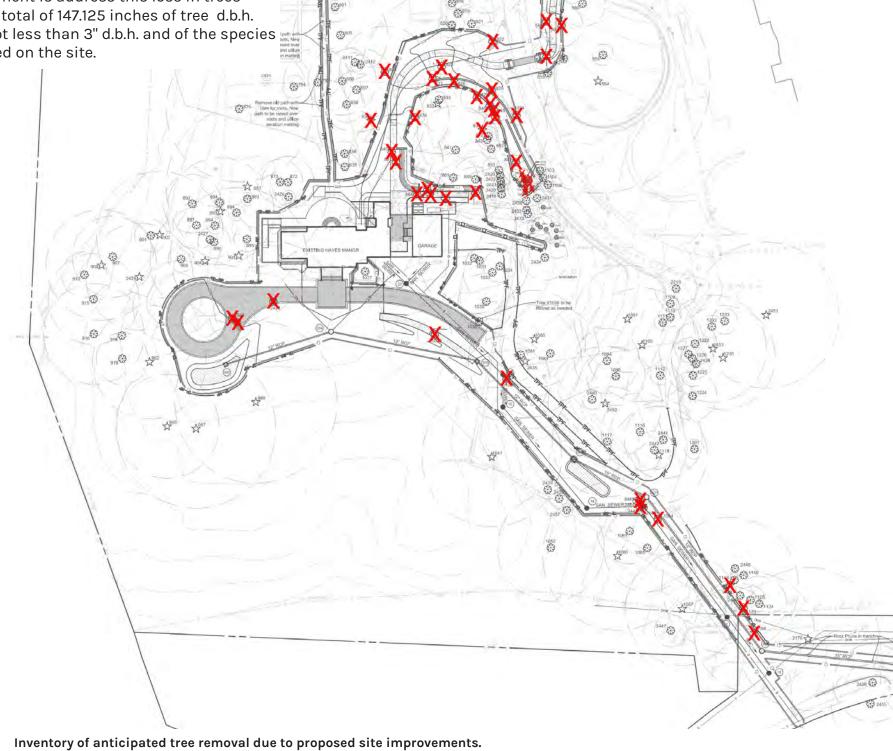
WORK ITEM #9:

TREE CONSERVATION PLAN

Description of Current Condition: The proposed site improvements discussed in this application will impact trees on the site. The trees which will be removed and others which will be impacted are identified in the map to the right and listed in the inventory below.

Proposed Work: The proposed site improvements will result in the loss of trees. The sum total of the diameter at breast height (d.b.h.) of the trees impacted equals 588.5 inches. The County mitigation requirement is address this loss in trees estimated to be a 4:1 replacement, meaning that the site improvements must include a total of 147.125 inches of tree d.b.h. replacement by planting new trees throughout the site. The replacement trees will be not less than 3" d.b.h. and of the species listed on the next page. This will result in approximately forty-nine (49) new trees planted on the site.

TREE ID#	DBH	SPECIES	IMPACT/REMOVE	% IMPACTED	CONDITION	MITIGATION
561	13	Willow Oak	Remove	100%	Good	13
563	9	Willow Oak	Remove	100%	Good	9
564	7	Red Maple	Remove	100%	Good	7
808	28	Red Oak	Remove	100%	Good	28
822	12	Sugar Maple	Remove	100%	Good	12
823	5	Flowering Dogwood	Remove	100%	Good	5
825	10	Sugar Maple	Remove	100%	Good	10
826	58	Tulip Poplar	Remove	100%	Good	58
827	5	Flowering Dogwood	Remove	100%	Good	5
828	10	Black Cherry	Remove	100%	Good	10
831	40 21	Tulip Poplar	Remove	100%	Good	40 21
834 835	33	White Oak White Oak	Remove	100% 100%	Good Good	33
840	18	Black Walnut	Remove Remove	100%	Good	18
844	7	Sugar Maple	Remove	100%	Good	7
845	9	Eastern Redbud	Remove	100%	Fair	9
846	6	Eastern Redbud	Remove	100%	Good	6
847	4,3,4,2	Serviceberry	Remove	100%	Fair	4
848	4,3,2,2,1	Serviceberry	Remove	100%	Good	4
860	16	Wild Cherry	Remove	100%	Good	16
863	3	Crape Myrtle	Remove	100%	Poor	3
864	15	Black Locust	Remove	100%	Fair	15
867	29	Black Locust	Remove	100%	Poor	29
983	9,10,11,11	Black Cherry	Remove	100%	Fair	11
985	15	Black Cherry	Remove	100%	Good	15
1030	9,13	Flowering Cherry	Remove	100%	Poor	13
1037	26.5	Shagbark Hickory	Remove	100%	Good	26.5
1064	4,4	Flowering Dogwood	Remove	100%	Dead	0
1101	4,4,3,5,4	Serviceberry	Remove	100%	Good	5
1123	11	Virginia Pine	Remove	100%	Good	11
1148	4	Hemlock	Remove	100%	Good	4
2156	37	Red Oak	Remove	100%	Fair - leans, deadwood	37
2413	14	Black Locust	Remove	100%	Good	14
2414	10	Black Locust	Remove	100%	Fair	10
2416	1	Slippery Elm	Remove	100%	Good	1
2417	1	Slippery Elm	Remove	100%	Good	1
2418	1	Slippery Elm	Remove	100%	Good	1
2419	1	Slippery Elm	Remove	100%	Good	1
2424 2425	6,4,1	Black Locust	Remove	100% 100%	Good	6
2425	5 37	Black Locust	Remove	100%	Good Good	5 37
2443	4	White Oak Black Locust	Remove Remove	100%	Good	4
2443	6	Black Locust	Remove	100%	Good	6
2445	4	Black Cherry	Remove	100%	Good	4
2446	5	Black Cherry	Remove	100%	Good	5
2457	2	Slippery Elm	Remove	100%	Good	2
2458	2	Slippery Elm	Remove	100%	Good	2
2459	2	Slippery Elm	Remove	100%	Good	2
87	49	Black walnut	Impact	12%	Good	0
553	3	White Fringetree	Impact	14%	Fair	0
554	69	Silver Maple	Impact	19%	Good	0
558	6	Red Maple	Impact	10%	Good	0
559	8	Eastern Redbud	Impact	3%	Good	0
560	14	Sugar Maple	Impact	5%	Good	0
565	3	Flowering Dogwood	Impact	5%	Fair	0
566	7	Sugar Maple	Impact	23%	Good	0
567	8	Red Maple	Impact	30%	Good	0
747	36	Black Walnut	Impact	67%	Good	0
749	47	Sweet Cherry	Impact	40%	Good	0
762	18	White Pine	Impact	5%	Fair	0
763	28	White Pine	Impact	21%	Good	0
786	5,4,6,6,5,4	Crape Myrtle	Impact	7%	Good	0
795	21	Norway Spruce	Impact	41%	Good	0
799	5,5,5,5,5,3,3	Crape Myrtle	Impact	12%	Good	0
801	7,7,5,5,3,3,2,3,4	Crape Myrtle	Impact	15%	Good	0
805	29	Norway Spruce	Impact	32%	Good	0



WORK ITEM #9:

TREE CONSERVATION PLAN (CONTINUED)

To mitigate the impact of the site improvements on the existing trees at the historic site, the project will include planting new trees to replace those lost. New trees will include a variety from the following species. Each tree will have a minimum caliper of 3", therefore the quantity of trees introduced to the site could be up to forty-nine (49) to cover the 147.125 inches required. In select locations larger trees will be considered to reduce quantity.

- Acer rubrum (Red Maple)
- Celtis occidentalis (Hackberry)
- Fagus grandifolia (American Beech)
- Liquidambar styraciflua (Sweet Gum)
- Nyssa sylvatica (Black Gum)
- Platanus occidentalis (American Sycamore)
- Quercus alba (White Oak)
- Quercus bicolor (Swamp White Oak)
- Quercus rubra (Red Oak)



EXTERIOR BUILDING IMPROVEMENTS

The following elevations provided here serve as a location diagrams to identify all exterior building improvements proposed at Hayes Manor. Each Work Item is listed below and detailed on the following pages.

Work Item #10: Rooftop Mechanical Penthouse & Condenser

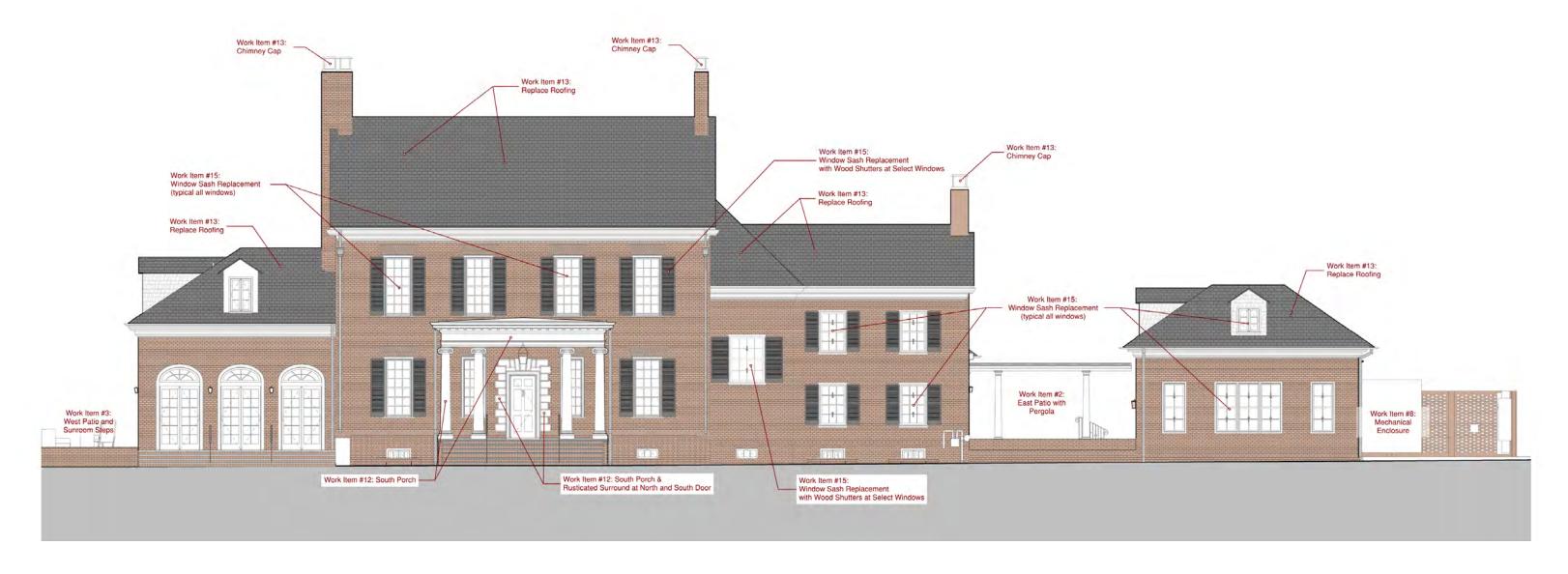
Work Item #11: Mechanical Louvers

Work Item #12: South Porch & Rusticated Surround at North and South Door

Work Item #13: Roof Replacement

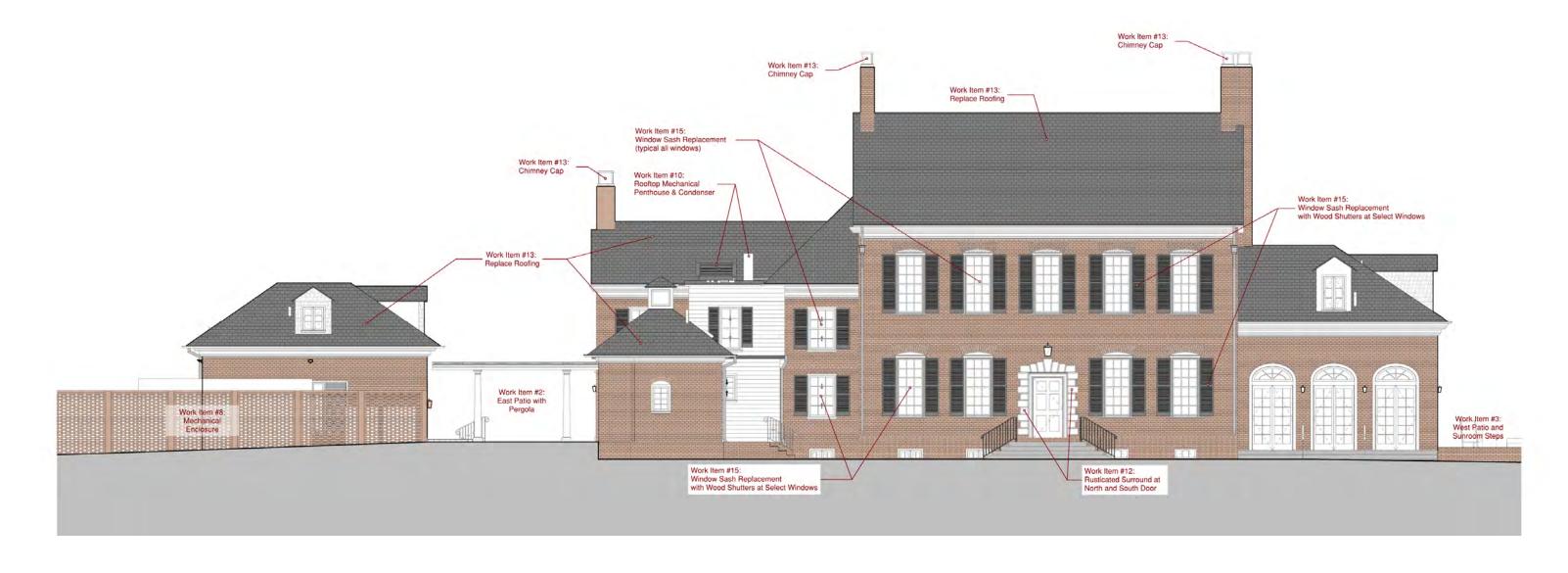
Work Item #14: Brick Masonry Restoration Work Item #15: Window Sash Replacement

SOUTH ELEVATION



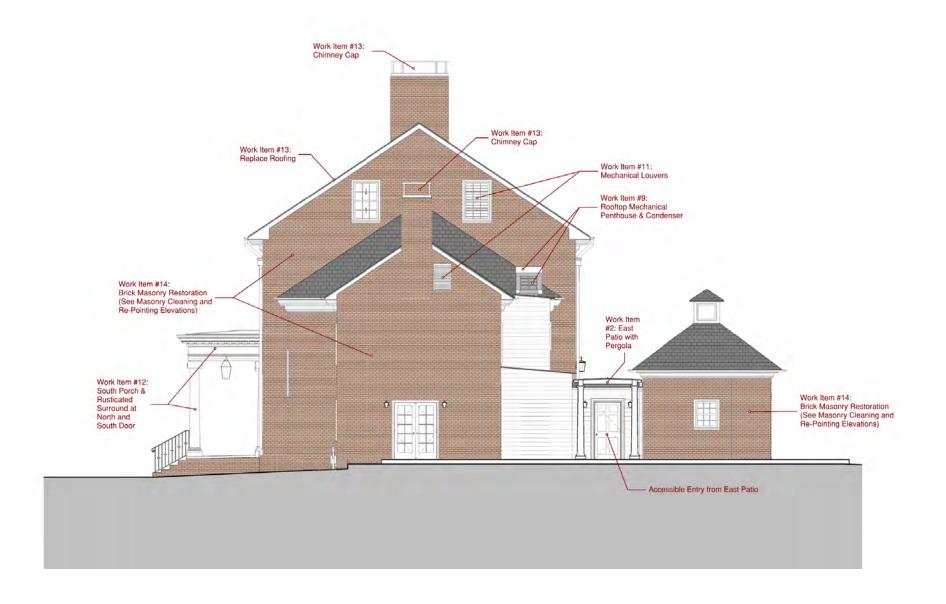
EXTERIOR BUILDING IMPROVEMENTS (CONTINUED)

NORTH ELEVATION



EXTERIOR BUILDING IMPROVEMENTS (CONTINUED)

EAST ELEVATION



EXTERIOR BUILDING IMPROVEMENTS (CONTINUED)

WEST ELEVATION



WORK ITEM #10:

ROOFTOP MECHANICAL PENTHOUSE & CONDENSER

Description of Current Condition: Three (3) existing exterior condensing units are located on a low slope flat seam metal roof along the north side of Hayes Manor. Adjacent portions of the building conceal these units from view and make it difficult to see them from grade.

Proposed Work: The proposed design includes a louvered penthouse for mechanical ventilation and an exterior condensing unit set on the flat seam metal roof. The louvered penthouse enclosure measures 62"L x 38"D x 36"H and comes in a variety of architectural finishes which will be custom matches to the adjacent metal roof. The condensing unit measures 36"L x 13"D x 53"H. This unit does not come in custom colors, but will be placed behind the penthouse to conceal it from view.



Proposed mechanical penthouse, provided in custom color to match adjacent metal roof.



Proposed mechanical condenser located behind mechanical penthouse.



Bird's eye view of mechanical equipment located on flat seam metal roof of rear addition.

WORK ITEM #11:

MECHANICAL LOUVERS

Description of Current Condition: The attic space of the historic foursquare features four (4) double hung wood windows along the east and west facades.

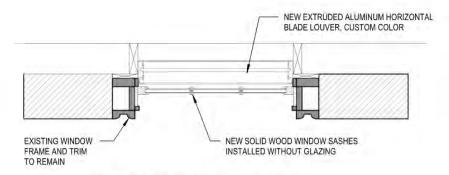
Proposed Work: To support the mechanical equipment located in the attic and avoid multiple penetrations in the slate tile roofing, three (3) of the existing window openings will be infilled with mechanical louvers to fit within the existing masonry opening. To conceal these modern louvers from direct view at the historic foursquare the louvers will be installed behind an open double hung window installed without glazing.

In addition to these louvers at the main attic space, the following louvers are required to support the new mechanical and ventilation systems:

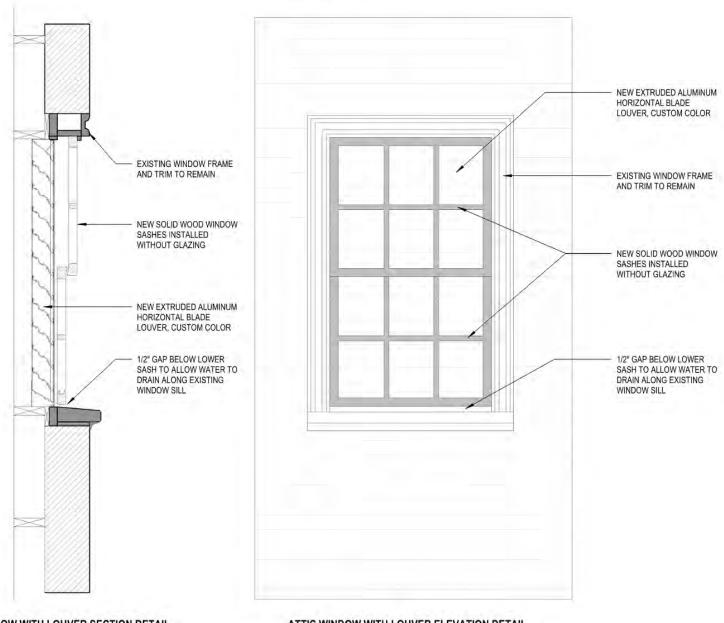
- Attic Above Master Room 208: New louver will be will be installed with approximately 6 sf louver to provide 50% free area. Custom color to match surrounding brick.
- Garage West Wall: New louver will be will be installed with approximately 6 sf louver to provide 50% free area. Custom color to match surrounding brick.
- Garage Window 1-30, Type N: New louver will be installed in existing window frame facing the Mechanical Enclosure area to provide 50% free area. Custom color to match original window frame.



Design precedent of mechanical louver concealed behind double hung window.



ATTIC WINDOW WITH LOUVER PLAN DETAIL



ATTIC WINDOW WITH LOUVER SECTION DETAIL

ATTIC WINDOW WITH LOUVER ELEVATION DETAIL

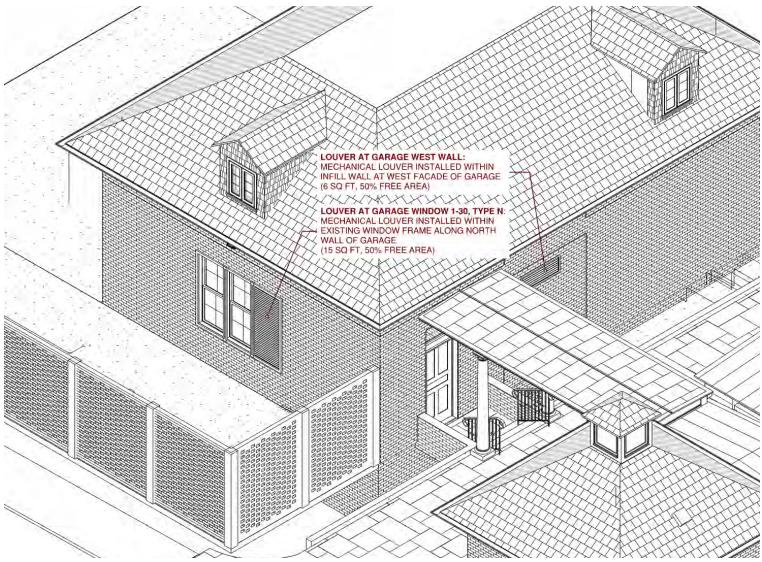
Details of proposed mechanical louver installed behind double hung wood window in attic.

WORK ITEM #11:

MECHANICAL LOUVERS (CONTINUED)



View of proposed mechanical louver in east wall above master bedroom.



View of proposed mechanical louver in north and west walls of Garage.

WORK ITEM #12:

SOUTH PORCH WITH RUSTICATED DOOR SURROUND

Description of Current Condition: The historic south porch that was documented in the 1960s HABS photography has been removed from the building.

Proposed Work: The proposed work will include recreation of the historic south porch per the HABS documentation. Detailing at the South Entry door will include recreation of the historic rusticated door surrounds per the HABS documentation. The rusticated detail will constructed of Keim Restauro Grund reinforced and installed in multiple lifts to achieve the desired thickness with beveled edges as detailed in the HABS drawings.

Archaeological investigations are also looking to uncover additional foundation information about the original porch at this location.

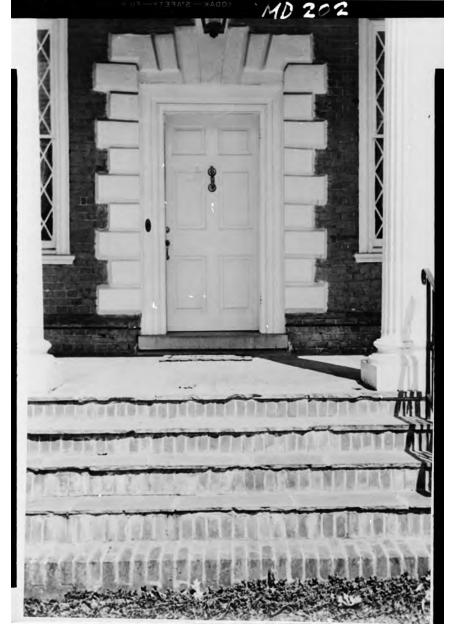


Photo of south door from Historic American Building Survey (1962)

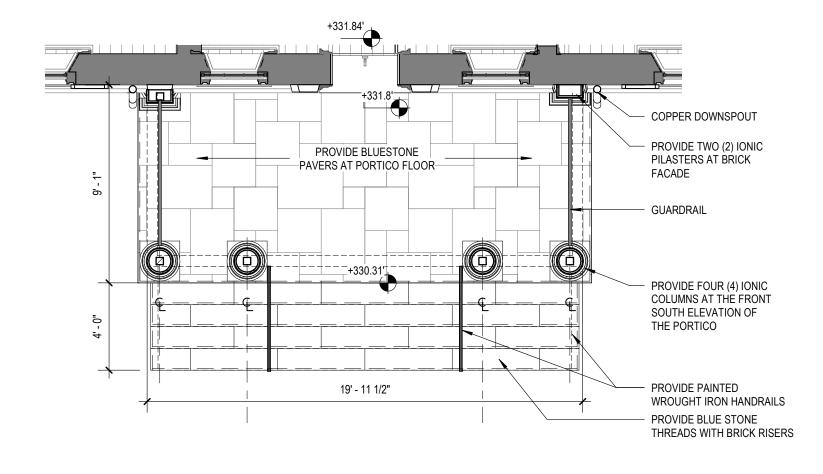


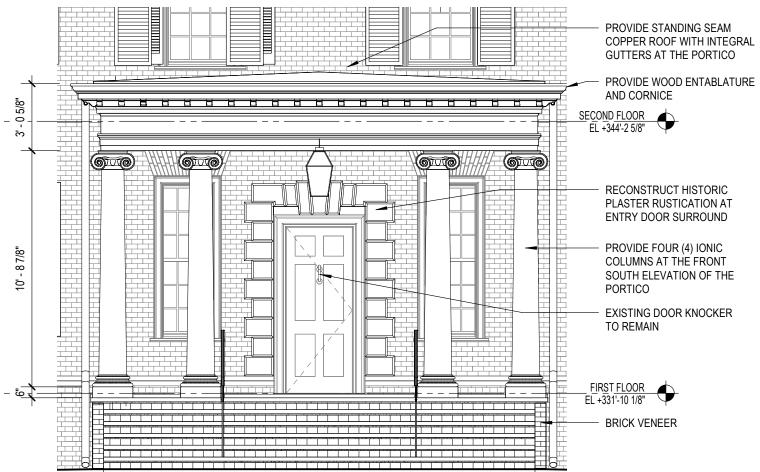
Photo of north door from Historic American Building Survey (1962)



Photo of south porch from Historic American Building Survey (1962)

SOUTH PORCH WITH RUSTICATED DOOR SURROUND (CONTINUED)





Enlarged plan of South Porch.

Enlarged elevation of South Porch.

WORK ITEM #13:

ROOF REPLACEMENT

Description of Current Condition: Existing slate shingle roofing is showing sign of wear with exposed flashing and missing roof tiles. Also, select modifications to the roof to remove skylights and other vent penetrations will require patching of the existing roof. The existing flat seam metal roofing has a deteriorated finish and open soldered joints.

Proposed Work: Replace the existing slate tile and metal roofing in-kind. Roof replacement will include new gutters and drain boxes to match HABS drawings. The flat seam metal roofing will be replaced with a zinc-tin coated copper to more closely match the grey color of the adjacent slate shingle roofing without requiring a painted finish. New chimney caps will be provided in the zinc-tin coated copper to match the color of the other roofing. Draft specifications for the slate shingle roofing, flat seam metal roofing, and chimney caps are included in Appendix B.



View of existing north flat seam roof with existing mechanical units.



View of existing slate shingle roof with existing skylight.



View of existing slate shingle roof at foursquare of Manor House.



View of existing slate shingle roof above west wing of Manor House.

ROOF REPLACEMENT (CONTINUED)



Design precedent of vented metal chimney cap.



View of existing north flat seam roof with existing vent and skylight.





Revere T-Z[®] Product is Durable, Attractive and Easy on the Environment.

Revere Tin-Zinc® products are coated on both sides with a unique, patented T-Z Alloy™ (tin-zinc alloy). It offers all the advantages of copper with a naturally weathering earthtone gray color. Revere's T-Z® coated products are rugged, environmentally friendly and aesthetically appealing, for use in virtually all architectural metal applications.

The three layers of FreedomGray Satin T-Z Alloy™.

Tin-zinc alloy with satin finish

2 Intermetallic layer

3 Copper (99.5% pure)

The tin-zinc alloy is applied to both sides of our sheets and coils, using the hot-dip process. This ensures complete coverage and eliminates voids.

A satin finish is factory-applied to FreedomGray Satin T-Z Alloy™, to reduce initial reflectiveness and provide a natural, weathered appearance. The satin-finished Tin/Zinc surface begins to oxidize and starts to darken upon exposure. Environmental conditions and severity of exposure dictate how long this will take.

As with plain and pre-patinated copper, FreedomGray Satin T-Z Alloy™ will always display differences in the shades and hues of it's natural patina. These are **NOT** an indication of defective material. In many respects it is the variations that give T-Z® coated products their unique life, vitality and aesthetics.

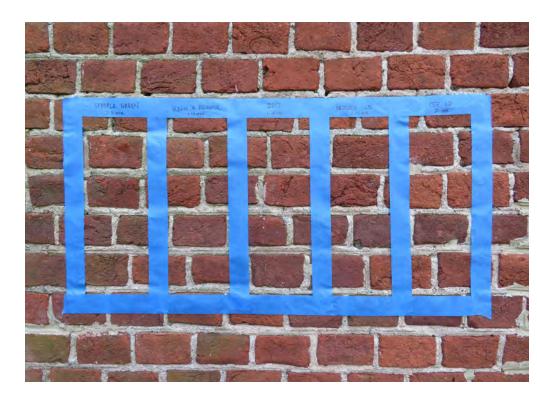


Product data for proposed zinc-tin coated copper flat seam roof.

BRICK MASONRY RESTORATION

Description of Current Condition: The existing historic masonry has areas of staining, biological growth, incompatible mortar repairs, cracks in mortar joints, and select mortar loss.

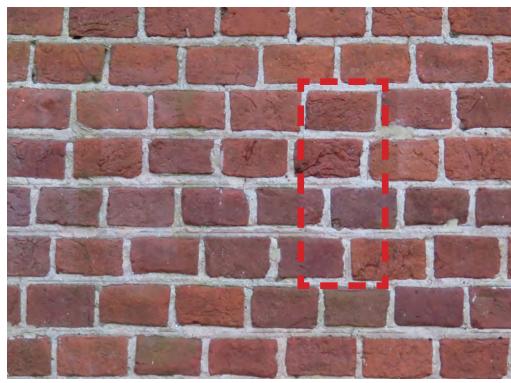
Proposed Work: The proposed work includes general cleaning and restoration of brick facade. Building Conservation Associates was retained by SmithGroup to conduct mortar sampling and masonry cleaning tests to inform the specifications. The following pages contain before and after photos of the cleaning and paint removal tests completed on the brick masonry at Hayes Manor. The results of the mortar analysis can be shared at a later date. Draft specifications for the masonry cleaning and repointing are included in Appendix C.



General Soiling Cleaning Tests (left to right) – Sunshine Makers Simple Green, Prosoco Klean 'N Release Cleaner, Prosoco 2010 All Surface Cleaner, Prosoco Light Duty Restoration Cleaner, and Cathedral Stone Light Duty Cleaner.



Biological Growth Cleaning Tests (left to right) – Prosoco ReVive, Prosoco 2010 All Surface Cleaner, Cathedral Stone Bio-Cleaner, and D/2 Biological Solution.



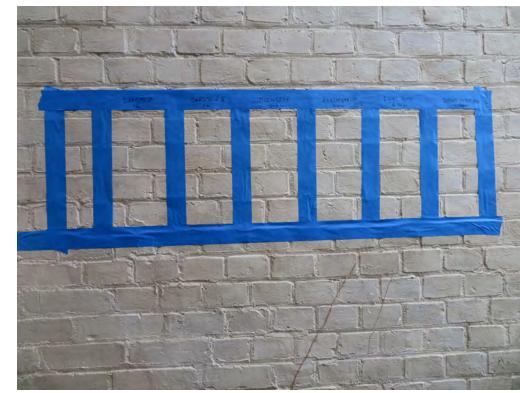
General Soiling Cleaning Tests – Prosoco Light Duty Restoration Cleaner was the most successful cleaner (red box).



Biological Growth Cleaning Tests – D/2 Biological Solution was the most successful cleaner (red box).



Efflorescence Cleaning Tests (left to right) – Prosoco 2010 All Surface Cleaner, Cathedral Stone Efflorescence Remover, and Prosoco 1260 Limestone & Marble Poultice



Paint Removal Cleaning Tests (left to right) – Prosoco SafStrip, Prosoco SafStrip8, Back to Nature Multi-Strip, Back to Nature Ready-Strip Pro, Cathedral Stone Light Duty Paint Remover, and Dumond SmartStrip



Efflorescence Cleaning Tests – Cathedral Stone Efflorescence Remover was the most successful cleaner but did not remove all the efflorescence (red box).



Paint Removal Cleaning Tests – Back to Nature Multi-Strip was the most successful stripper (red box).

SOUTH ELEVATION

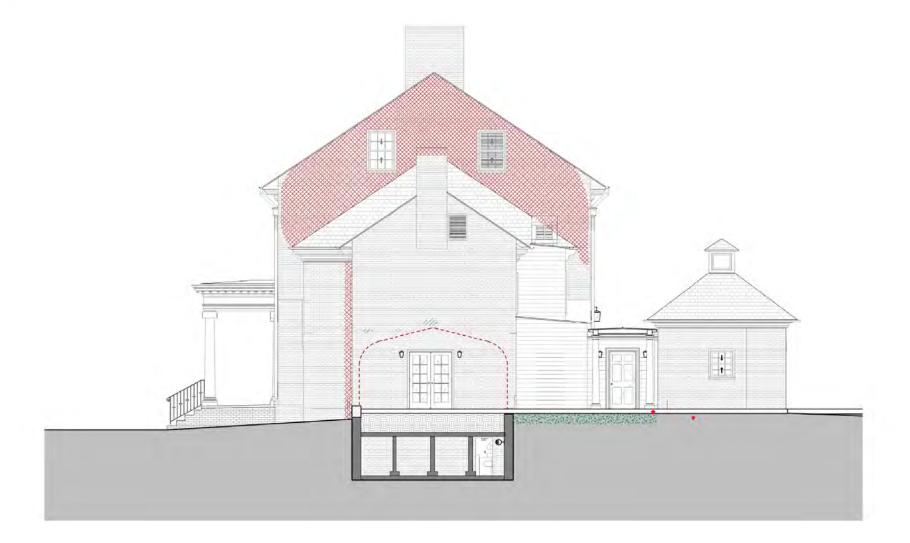


NORTH ELEVATION



EAST ELEVATION





WEST ELEVATION





WINDOW SASH REPLACEMENT

Most of the existing windows at Hayes Manor are single glazed, solid wood double hung windows installed in the 20th century. A few awning windows are installed in the basement and several of the dormer windows at the second floor above the Sunroom and at the second floor above the Garage have been fitted with casement sashes.

These existing wood windows are in fair condition. Many are inoperable due to being secured shut or broken counterweights. The single pane glazing is energy inefficient and incompatible aluminum frame exterior storm windows have been installed at many of the windows.

The proposed design includes removal of the exterior aluminum frame storm windows to restore the historic appearance and visual depth to the fenestration. To improve energy efficiency and operability the design includes replacement of the single glazed sashes with sashes fitted with insulated glazing and simulated divided lites. The use of simulated divided lights allows for the muntin profiles to be replicated while also maintaining an overall sash thickness that allows for the new sashes to fit within the historic frames. The proposed sash replacement will require removal of the parting bead but will not require any modification or removal of the historic trim on both the interior and the exterior of each window. This is critically important at the historic foursquare of the house where the interior trim is ornate and complex.

The windows have been assessed and categorized into different stylistic groups. These groups are primarily distinguished by the style of the exterior trim. Within each group there are different window types established to identify minor differences, primarily the size of the window and the individual lite patterns. The following details present the typical jamb, sill, and header conditions of each group to document the details of the existing window in relationship to the proposed sash replacement.



Sash pulley and counterweight rope exists in many window located, however some are broken or missing.



Select windows have been secured shut using screws in jambs.



Aluminum sash track in historic windows of foursquare, interior side of exterior aluminum frame storm window visible.



Evidence of prior shutter hinge see in patched area of exterior window trim. Surrounding masonry has been re-pointed in several locations concealing former shutter dog anchoring devices.

WINDOW SASH REPLACEMENT (CONTINUED)

GROUP 1

- Type C: Located along the south facade of the foursquare of Hayes Manor, these windows are a primary character defining feature of the structure. Replacement shutters will be provided at window type C.
- Type D: Located along the south facade of the foursquare of Hayes Manor, these windows are a primary character defining feature of the structure. Type D differs from type C in the overall width of the masonry opening and the lite pattern due to this smaller size. Replacement shutters will be provided at window type D.
- Type J: Located along the north facade of the foursquare of Hayes Manor, these windows are a primary character defining feature of the structure. These windows match Type C except for the arched lunette at the top of the window just below a segmental brick arch. Replacement shutters will be provided at window type J.
- Type M: Located at the attic level of the foursquare of Hayes Manor, these wood double hung windows are in poor condition. Each has been secured shut. Three of the four windows installed at the attic level are being reconfigured to provide necessary mechanical louvers. The details of these louvers are provided under Item #7. Replacement shutters will be provided at window type M.



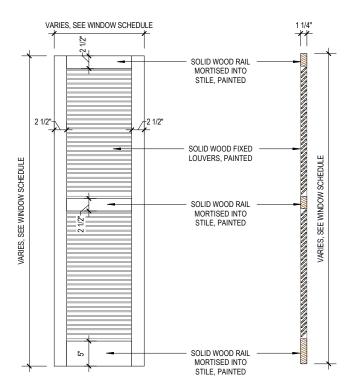
Window Type C (Group 1)



Window Type D (Group 1)



Window Type J (Group 1)



Typical fixed solid wood shutter detail to be installed at windows in Group 1 and Group 2.



Window Type M (Group 1)



Typical shutter hinge to be installed at windows in Group 1 and Group 2.

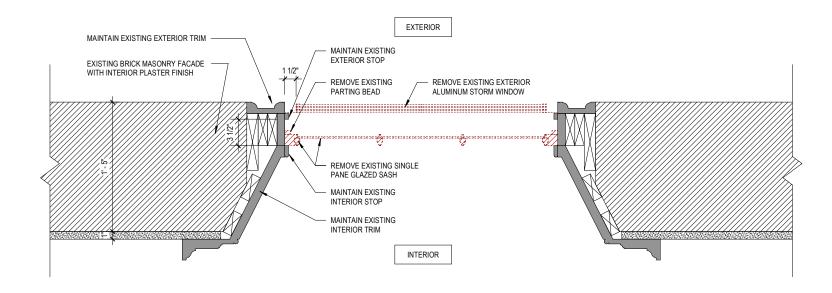


Typical shutter dog to be installed at windows in Group 1 and Group 2.

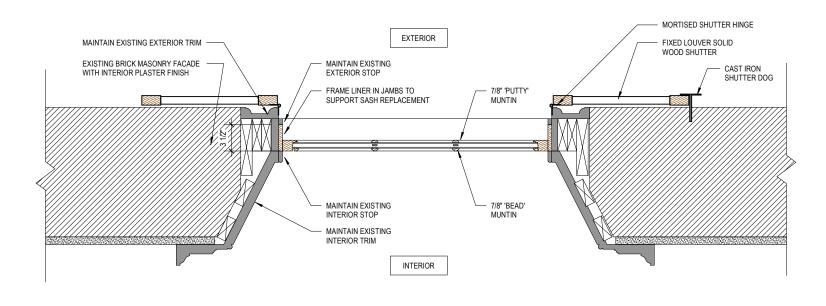
WINDOW SASH REPLACEMENT (CONTINUED)

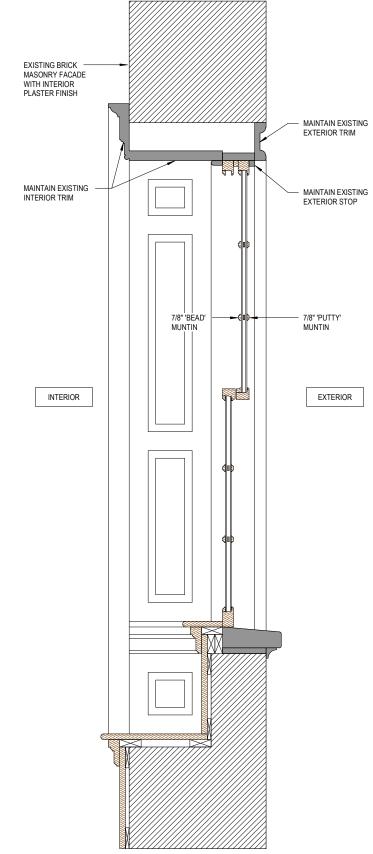
Group 1

- Type C
- Type D
- Type J
- Type M



WINDOW GROUP 1: DEMOLITION DETAILS





WINDOW SASH REPLACEMENT (CONTINUED)

GROUP 2

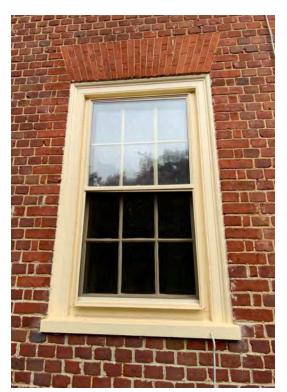
- Type A2: Double hung wood windows located at the basement and largely concealed from view by semi-circular areaways. Exterior and interior detailing matches many windows in the east wing of the house constructed in 1899.
- Type E: There is only one (1) instance of Type E which is located along the south facade of the east addition to the house constructed in 1899. Based upon the HABS documentation completed in 1965 and on-site investigations it is believed that the existing casement sash is a more recent modification in a frame which once featured a double hung window. The proposed design calls fore replacement of the diamond patterned casement window be replaced with a double hung wood window. The HABS drawings depict a 1/1 double hung window in this location, but the historic photography from this time period show the existing casement window installed at this time. Replacement shutters will be provided at window type E.
- Type F: Type F represents several double hung wood windows present at first and second floors of the 1899 east wing addition to Hayes Manor. The style and detailing is very similar to Type A2. Replacement shutters will be provided at window type F.
- Type K: There is only one instance of type K. The detailing is similar to other windows in Group 2; however, the window is installed in a wood framed exterior wall with exterior wood siding. Replacement shutters will be provided at window type K.
- Type N: Double hung wood windows located at the first floor of the garage.
- Type P: Very similar in style to Type N, but installed in a wider masonry opening, there is only one instance of Type P located in the garage. The proposed design includes modification to remove the existing window and installation of a new door into the garage. This change is proposed to provide a more direct covered pathway from the garage to the accessible entry into the Manor House. Relocation of the garage door to this location will allow for a simpler design of the overhead condition.



Window Type A2 (Group 2)



Window Type E (Group 2)



Window Type F (Group 2)



Window Type K (Group 2)

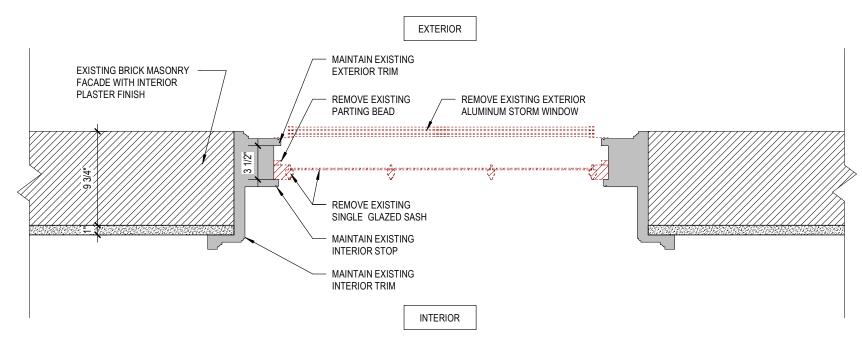


Window Type N (Group 2)

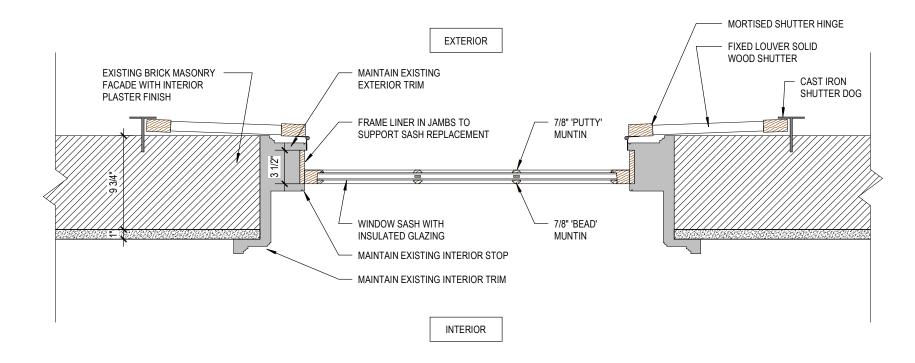
WINDOW SASH REPLACEMENT (CONTINUED)

Group 2

- Type A2
- Type E
- Type F
- Type K
- Type N
- Type P



WINDOW GROUP 2: DEMOLITION DETAIL



WINDOW GROUP 2:
REPLACEMENT SASH PLAN DETAIL

WINDOW SASH REPLACEMENT (CONTINUED)

GROUP 3

- TYPE A1: There is only one instance of window type A1, a casement window installed in the basement and largely concealed from view by an areaway. Based on the size, location, and adjacent areaway, this window was likely modified to allow for easier replacement of mechanical equipment in the basement. The proposed design maintains this casement window design for this reason.
- **TYPE L:** The second floor room above the west Sunroom features three (3) dormer windows. These dormers are fitted with casement sashes as seen in the 1962 HABS drawings and photographs.
- **TYPE Q1:** The second floor room above the garage features three (3) dormer windows. The north and south dormers are fitted with double hung wood windows, however the 1962 HABS drawings indicate these windows had casement sashes similar to the dormers in the roof over the Sunroom.
- **TYPE Q2:** The second floor room above the garage features three (3) dormer windows. The west dormer is fitted with casement sashes similar to the dormers in the roof over the Sunroom.



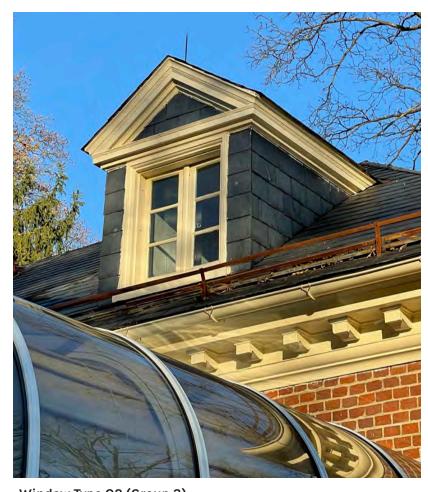
Window Type A1 (Group 3)



Window Type Q1 (Group 3)



Window Type L (Group 3)

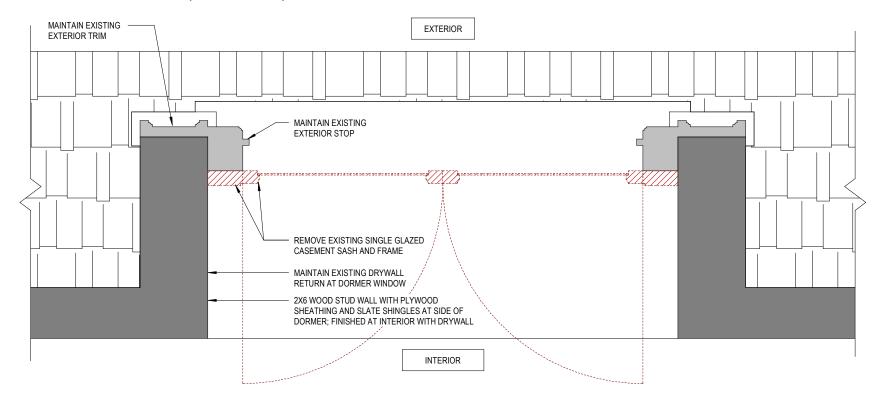


Window Type Q2 (Group 3)

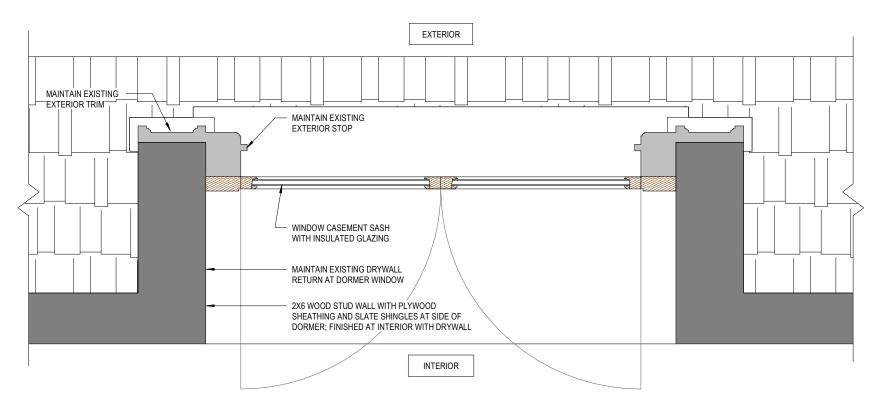
WINDOW SASH REPLACEMENT (CONTINUED)

Group 3

- Type A1
- Type L
- Type Q



WINDOW GROUP 3: DEMOLITION DETAILS



WINDOW SASH REPLACEMENT (CONTINUED)

GROUP 4

- TYPE G: The 1/1 double hung windows installed at the north wing kitchen addition are more recent window replacements believed to date to the 1990s. The proposed design includes replacement of the windows to include the sashes and frames while maintaining the exterior trim profiles.
- **TYPE R:** The cupola above the north kitchen wing features four (4) operable windows. These windows are in poor condition and the design includes replacement of the windows with fixed sashes to match the style of the existing.



Window Type G (Group 4)

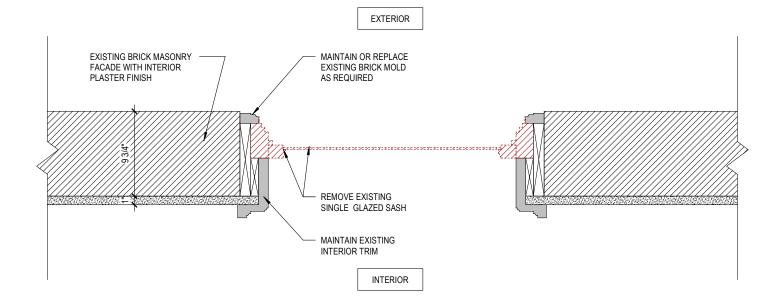


Window Type R (Group 4)

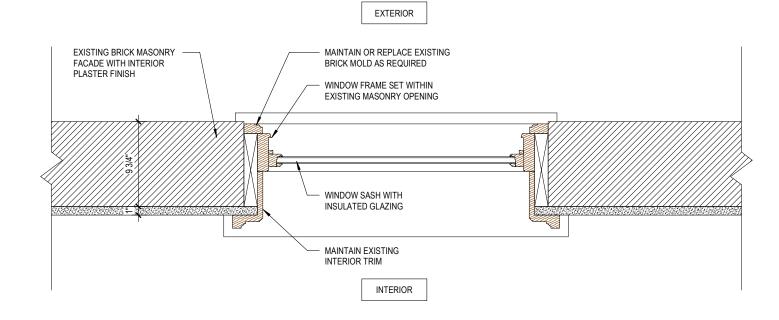
WINDOW SASH REPLACEMENT (CONTINUED)

Group 4

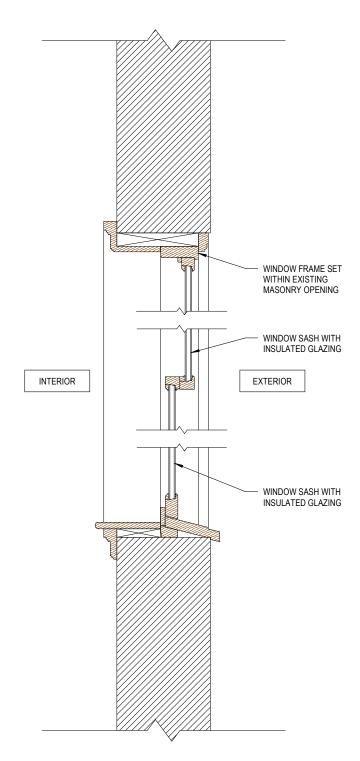
- Type G
- Type R



WINDOW GROUP 4: DEMOLITION DETAILS



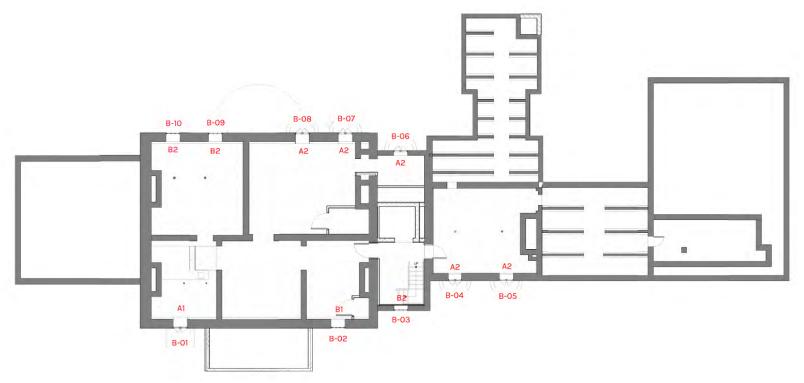
WINDOW GROUP 4:
REPLACEMENT SASH PLAN DETAIL



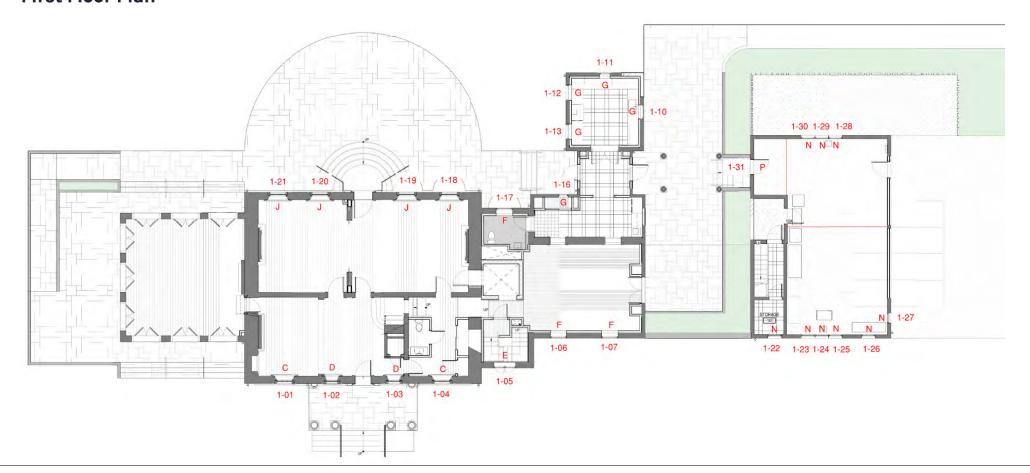
WINDOW GROUP 4:
REPLACEMENT SASH SECTION DETAIL

WINDOW SASH REPLACEMENT (CONTINUED)

Basement Floor Plan

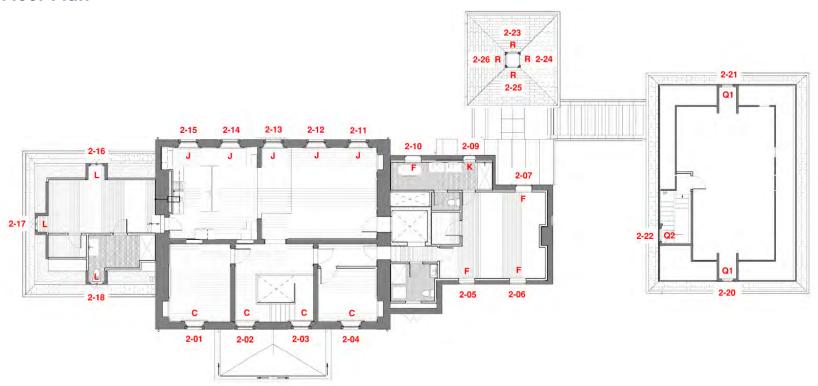


First Floor Plan

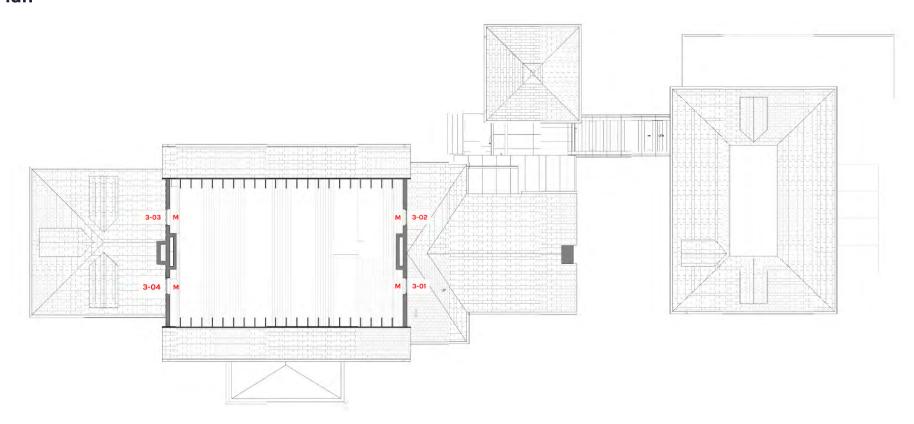


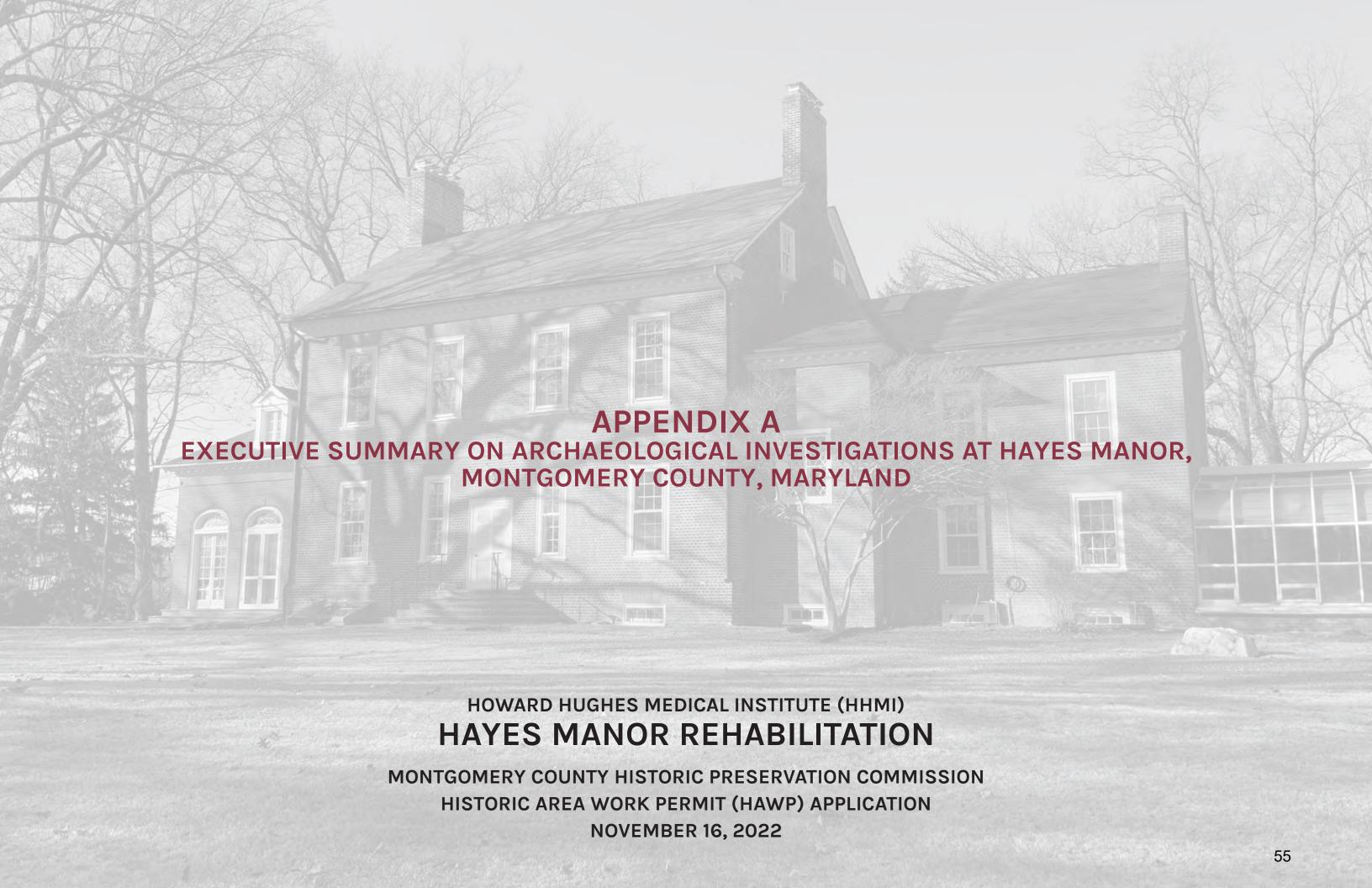
WINDOW SASH REPLACEMENT (CONTINUED)

Second Floor Plan



Attic Plan







Executive Summary on Archaeological Investigations at Hayes Manor, Montgomery County, Maryland

Prepared for: The Howard Hughes Medical Institute

> Prepared by: Kerry S. González, M.A.

Gray & Pape 2005 East Franklin Street, Suite 2 Richmond, Virginia

Kerry S. González, M.A.
Principal Investigator
November 14, 2022

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Table 1. Quantities of artifacts recovered from the archaeological investigations	. 10

1.0 INTRODUCTION

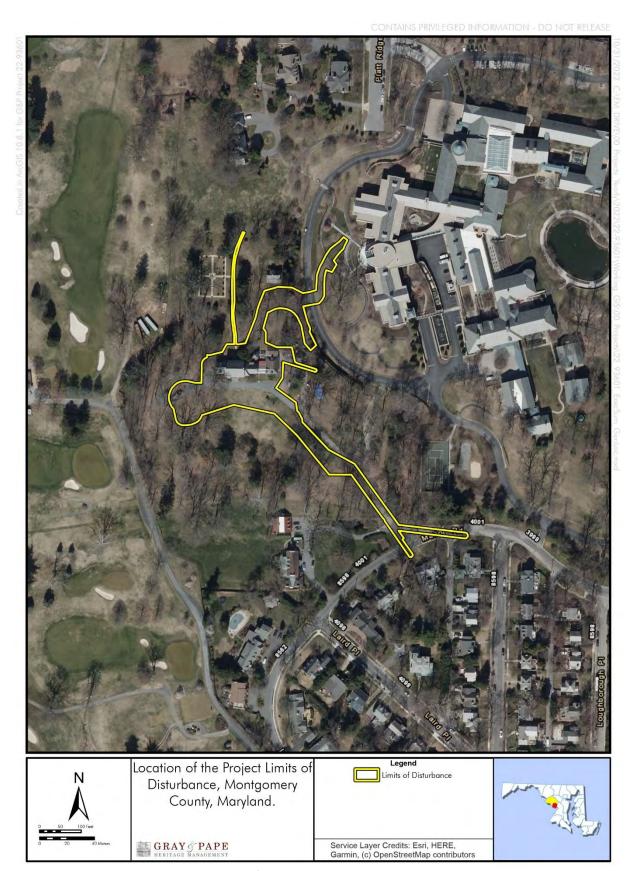
The Howard Hughes Medical Institute (HHMI) is planning rehabilitation, landscape modifications and other infrastructure improvements around the Hayes Manor property (18MO689/35-10) in Montgomery County, Maryland. The area where ground disturbing activities are planned totals approximately 2.2 acres (ac) (0.9 hectares [ha]) and is defined as the Limits of Disturbance (LOD) for the project. This Project specifically involves the following exterior changes to the property: installation of new utilities across the south lawn, fire lane access, a new porch on the south elevation, and a new north-south trending path in the north yard (Figure 1). Archaeological investigations of the property were requested by the Montgomery County Planning Department to support the issuance of a Historic Area Work Permit (HAWP in advance of the proposed rehabilitation and exterior changes to Hayes Manor.

This work was performed by a Secretary of the Interior (SOI)-qualified archaeologist. HHMI has contracted Gray & Pape, Inc. (Gray & Pape), to conduct the archaeological investigations associated with this project. The previous work performed by Robinson and Associates (2004), the Montgomery Parks archaeological staff in 2008, as well as historic mapping completed by SmithGroup (2022) were utilized in the preparation of this study.

1.1 Project Overview

The Hayes Manor property covers approximately 9.44 ac (3.8 ha) is located west of the main HHMI campus, north of Manor Road, and east of the Columbia Country Club. Neither the archaeological site 18MO689 or the home M: 35-10 have a formal National Register of Historic Places (NRHP) determination; however, M:35-10 was listed on the Master Plan for Historic Preservation in Montgomery County in 1983. The associated archaeological site, 18MO689, is directly associated with the manor complex and is mapped to overlap with the boundaries of the manor complex built resource.

Gray & Pape's initial archaeological investigations within the LOD for Hayes Manor HAWP included a pedestrian survey, the excavation of 73 STPs, a geophysical survey of approximately 0.60 ac (0.25 ha), sampling of two geophysical anomalies (JM-1 and JM-2), and the excavation of six metal detector hits to explore magnetometry hits. This work resulted in the recovery of 120 artifacts dating to the late-eighteenth through mid-twentieth century with a small concentration of materials in the south lawn. This area may indicate the location of a building or buildings that were once part of the domestic landscape of the property.



 $\label{top:control} \mbox{Figure 1. Location of LOD within Montgomery County, Maryland}.$

2.0 FIELD AND LABORATORY METHODS

The archaeological methods used for this project were specifically designed to address research questions related to the property, more specifically its historic landscape, and the potential for the LOD to contain archaeological or landscape features or deposits that contribute to its historical significance. Their overall purpose was to permit investigators to identify any cultural resources that lie within the HAWD LOD and provide information for potential next steps and upon which to base at least a preliminary evaluation of historic significance.

2.1 Site File and Literature Review

To determine the presence, or likelihood, of cultural resources within or near the project area, a historic literature and background research was conducted by searching the Maryland Inventory of Historic Properties (MIHP) at the Maryland Historic Trust. Local repositories in the vicinity of the Hayes Manor also were consulted as were online resources such as the Library of Congress. Historical maps, architectural site files, county histories, NRHP listings, and previous archaeological and cultural resources survey reports were consulted at these facilities.

2.2 Field Methods

The goals of the archaeological investigations were to conduct an initial archaeological investigation to document the archaeological resources across the LOD. The archaeological study consisted of four survey methodologies in accordance with the Montgomery County Planning Department's request for archaeological investigations at Hayes Manor. These included an intensive pedestrian survey, a geophysical survey, the excavation of shovel test pits (STPs), and a limited metal detector survey.

Prior to the geophysical and subsurface investigations, Gray & Pape established a grid within the LOD. The grid used coordinates along a grid in Northings and Eastings. When possible, coordinates were taken on points that are visible on aerial images, such as road intersections and building corners, to aid in georeferencing those features. The grid also was used to define the location of the STPs.

Existing vegetation, surface features, and landscape elements are critical data for understanding a domestic site; these features very often reflect how the site was used and evolved over time. A detailed plan of these features was be prepared using the GPS. Data from historic maps and other cartographic data provided in the Robinson & Associates document, as well as from historic satellite and aerial imagery was added to the site plan to document current and past conditions.

2.2.1 Pedestrian Survey

Prior to conducting the geophysical survey, Gray & Pape archaeologist performed a pedestrian survey of the area to identify any vegetative markers or above-ground remains that could indicate the locations for cultural activity or potential garden/landscape features related to the historic occupation of the property. For example, staff paid close attention to locations noted on the Historic American Buildings Survey documents that showed potential outbuildings within the property.

2.2.2 Geophysical Survey

The detection of archaeological features through geophysical survey is a challenging objective; archaeological features can be small and often difficult to detect. When searching for small archaeological features, it is important to account for soil conditions, known surface obstructions,

utility lines, and other things that might obscure archaeological features. For this reason, it is best to utilize more than one type of geophysical survey instrument. While one instrument may be able to detect an archaeological feature, the other instruments can help establish the context of the feature, while increasing the chances of locating additional archaeological features. Unfortunately, it is not possible to know ahead of time which instrument is most likely to detect the most features within a study area. Fortunately, the current survey area is relatively small, which allowed for a quick multi-instrument survey. Three instruments were employed during the survey work: ground penetrating radar, an electromagnetic conductivity meter, and magnetic gradiometer.

Ground penetrating radar is a traditional technique typically used in archaeological surveys. For this project, we used a GSSI SIR 3000 with a 400 MHz antenna with data collected at a rate of 50 scan/traces per meter along transects spaced 1.64 feet (ft) (50 centimeters [cm]) apart. This level of data density helped to sort out natural features (e.g., tree roots) from archaeological features. The radar also detected sidewalks, foundations, and other shaft-type features, such as wells or privies.

Electromagnetic conductivity meters (aka EM) are also often useful for detecting archaeological features. They measure the ground's ability to conduct electricity, which is impacted by the soil types, and disturbance created by excavated features. EM systems can detect all types of metal, but they are less affected than magnetometers regarding ferrous objects. The instrument used in this survey was a Geonics EM 38-MK2, which records two geophysical properties simultaneously (conductivity and magnetic susceptibility) with two different sensors, and it measures these properties producing four different datasets during one pass. Data collection occurred at a sampling rate of approximately sixteen data recording per meter along transects spaced 3.28-ft (1 m) apart. This powerful tool can be quite useful in archaeologically complicated settings, especially when paired with a second instrument.

A magnetic gradiometer is often used to detect archaeological features. It employs the use of two magnetometer sensors positioned at a known fixed distance from each other, usually in the vertical configuration. A magnetic gradiometer is extremely sensitive and detects even the smallest trace of ferrous metals near the surface with ease. This survey employed a Bartington Instruments Grad601-2 Gradiometer with two dual sensors spaced 3-ft (1-m) apart in the vertical gradient configuration. The sampling rate was eight samples per meter and transects were placed at an interval spacing of 1.64 ft (0.50 m).

For the survey's purposes, the geophysical survey data was collected along the survey grid established on the property. The grid was georeferenced using a RTK GNSS (i.e., a GPS), and the results of the survey work was pulled into a GIS of the LOD.

2.2.3 Subsurface Investigations

Concurrent with the geophysical survey, Gray & Pape archaeologists excavated shovel tests in accordance with the recommendations provided by the Montgomery County Planning Department. This work was led by archaeologists meeting the Secretary of Interior Standards (SOI) for archaeology.

The preestablished grid was used for the following STP survey. Due to the archaeological potential of the property, STPs were spaced at 30-ft (9.1 m) intervals along systematically spaced transects 30-ft (9.1 m) apart. Radial STPs were excavated around all STPs positive for cultural material at a 15-ft (4.5 m) interval. Shovel tests measured approximately 15-inch [in] (0.38-m) in diameter and did not exceed 3.2 ft (0.97 m) in depth. All soils removed from each STP were screened through 0.25-in (0.6-cm) mesh, and all recovered artifacts were bagged and labeled, with appropriate provenience information. All cultural artifacts encountered were collected for analysis at Gray & Pape's Richmond, Virginia office. Delineation of archaeological loci and features were confined to the LOD.

Upon the completion of the geophysical study and shovel test survey, a metal detector survey was conducted in selected portions of the LOD, primarily to explore anomalies identified during the geophysical survey. A MineLab Equinox was utilized for this part of the study and was conducted by staff who has several years of experience operating a metal detector. Some metal detector hits were identified outside of the LOD. The location of these materials were recorded on project mapping, but the source of hits were not collected.

2.3 Laboratory Analysis

All collected artifacts were processed at Gray & Pape's Richmond laboratory in accordance with the standards outlined in the Standards and Guidelines for Archaeological Investigations in Maryland and its technical addendum for laboratory activities. Artifacts were washed, or otherwise cleaned as required by their state of preservation, and then sorted, cataloged into an Access database, labeled, and placed in appropriately labeled plastic bags in preparation for final curation. Artifact provenience was maintained throughout the process using a computerized field specimen log, generated at the time of collection, which in turn generated an inventory of materials recovered.

Cataloging of the assemblage consisted of dividing the materials into specific groups based on material type and function, within each provenience, as part of the initial analytic step. For example, nails (and window glass were placed in an Architectural category while ceramics and glass were included in the Kitchen group. Additional functional groups that were used include Activities, Clothing, Firearms, Food Remains, Fuel/Energy, Furniture, Personal, Transportation, and Miscellaneous/Other. Gray & Pape uses this analytical technique to better understand the types of activities that occur onsite.

Ceramics were grouped by earthenware (refined and coarse), stoneware (refined and coarse), and porcelain, paying close attention to the type of decoration and motif, if present, on each sherd as well as vessel form which can aid in determining function. Manufacture dates for each ware type were obtained using the Digital Archaeological Archive of Comparative Slavery (Aultmen et al. 2014) and the Maryland Archaeological Conservation (MAC) Lab (MAC Lab 2015). The identification of bottle and vessel glass was conducted using Madden and Hardison and the Society for Historical Archaeology Historic Glass Bottle Identification & Information Website (Lindsay 2020). Additional materials that would be included in the Personal, Firearms, or Food Group was identified using current and widely accepted primary and secondary sources.

2.4 Curation

Upon completion of the project, the archaeological collections will be delivered to HHMI with the recommendation that they be turned over to Montgomery County or the Maryland Historical Trust's Maryland Archaeological Conservation (MAC) Laboratory for permanent curation. Materials included with the collection as part of final curation include project documentation materials. This may include the original field paperwork (excavation forms, field director's notes, field drawings, etc.), a photographic log, and a copy of the final report. Acid free paper will be used for the field paperwork whenever possible. If it is not possible, the original field paperwork will be photocopied on to acid free paper and both the original and photocopies will be submitted with the collection.

3.0 HAYES MANOR IN CONTEXT

Hayes Manor, constructed by approximately 1767, is considered to be one of the most pristine examples of Georgian architecture in Maryland. Built for Anglican minster Alexander Williamson, rector of Prince George's Parish, it was the centerpiece of a circa 700-ac (283.3-ha) estate previously known as "Clean Drinking." Upon building his home there, Williamson dubbed it Hayes Manor after the English estate of William Pitt the Elder. Hayes Manor was constructed to be a house suitable for a man of Williamson's station and placed him conveniently between his parish church at Rock Creek and his chapel at Laytonsville (Fiennes 1997). Williamson resided there until his death in 1786.

Georgian architecture is characterized by simple rectangular plans, two-rooms deep and no more than two full stories in height with perfect symmetry in the placement of doors and windows. Front doors are typically centered and feature decorative crowns and pilasters. Windows have double hung sashes and are arranged in evenly spaced rows, and cornices typically feature decorative molding, usually in the form of dentils (McAlester 2017). Hayes Manor exemplifies this through the floor plan and elevations of its original central block, constructed of brick on a basement foundation. The identity of Hayes Manor's architect is unknown, although it may have been designed by Virginian John Ariss (Dwyer 1975), who designed a number of other buildings in Virginia and Maryland and was active at least by 1751 (Lounsbury 2011). It is similarly unknown who is responsible for the ornate woodwork on the interior of the home, although it may have been William Buckland (Dwyer 1975). Buckland's work is also well-known in the region, starting with that at George Mason's Gunston Hall in Fairfax County, Virginia (Whiffen 1981).

A number of alterations have been made to Hayes Manor over the years, with the most salient being the addition of the east and west wings, in 1894 and 1908, respectively (Dwyer 1975). Both of these wings were added by George T. Dunlop, Sr., whose family had owned the property since it was purchased by James Dunlop in 1792 following the death of Alexander Williamson (Fiennes 1997). A garage and greenhouse were also added to the house's east wing in 1908. The interior of the house has also been renovated to some extent throughout the years. Although the design and functions of rooms have changed, much of the original flooring and woodwork remains intact (Dwyer 1975).

In terms of landscape modifications, the property is vastly different than how it was originally designed. The research by Robinson & Associates as well as the data compiled by SmithGroup accurately illustrates these modifications, which have been divided into eight distinct time periods with Period 1 being the most significant to understanding the evolution of this property.

Period 1, defined as Initial Construction & Landscape Development (1763–1791), was the period in which most of the outbuildings and landscape features were constructed. Historical records from the time indicate the property had a lower terraced garden, a bowling green, a north garden, a courtyard, a barn and stables, quarters for enslaved workers, a carriage house, a granary, a corn house, and a coach house. While the majority of the built elements of the eighteenth-century landscape are no longer extant, the landscape features, both depicted in records and not, retain an archaeological signature. It is these features that have the greatest potential for providing data on this historic property.

4.0 PRELIMINARY RESULTS OF EXCAVATIONS

The archaeological investigations of the LOD within the Hayes Manor property consisted of a pedestrian inspection of the entire LOD, the excavation of 73 STPs (two of which were exploratory STPs [JM-3 and JM-4] to further examine anomalies identified during the geophysical survey), a geophysical survey of approximately 0.60 ac (0.25 ha) within the LOD, augmented by a metal detector survey of selected anomalies found during the geophysical study (Figure 2 – Figure 4) (Appendix I). STPs were not excavated outside of the Hayes Manor LOD, in areas of obvious disturbance, existing roadways, and buried utilities.

The archaeological investigations resulted in the recovery of 120 artifacts dating from the late-eighteen through mid-twentieth century (Table 1). These materials were primarily located in the southwestern portion of the LOD, however, a smaller concentration is also located in the southeastern portion of the south yard. These two loci may be an indication of no longer extant buildings that were once part of the late-eighteenth to early-nineteenth century landscape.

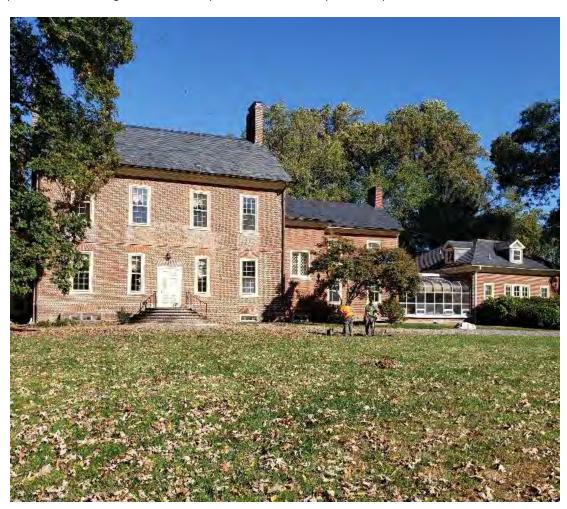


Figure 2. View of south entrance of Hayes Manor, facing north.

Of the 120 recovered artifacts, over 50 percent are from the architectural category. Architectural debris consists of 56 fragments of window glass consisting of light green, aqua, and clear and nine nails or nail fragments (Figure 5).

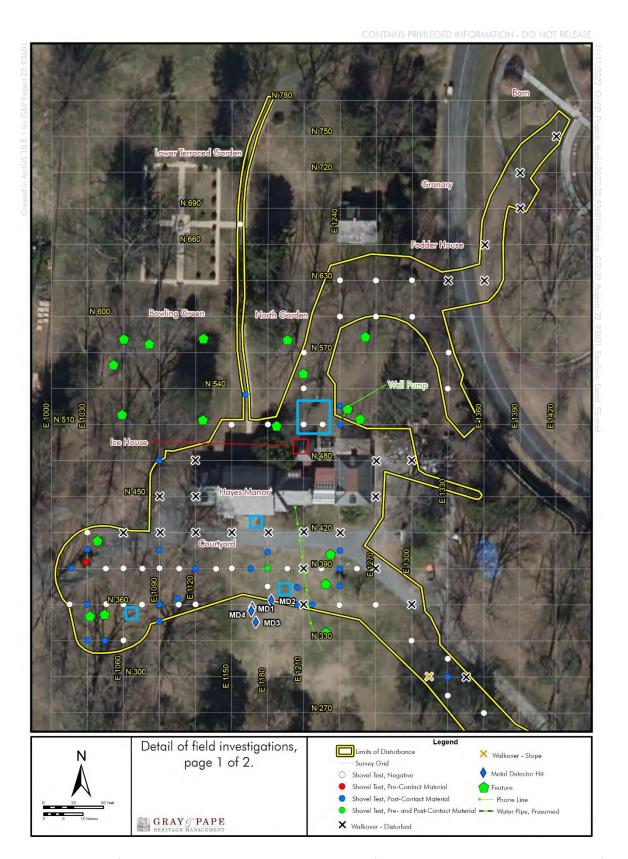


Figure 3. Detail of archaeology testing within northern portion of Hayes Manor. Blue boxes mark areas of interest.

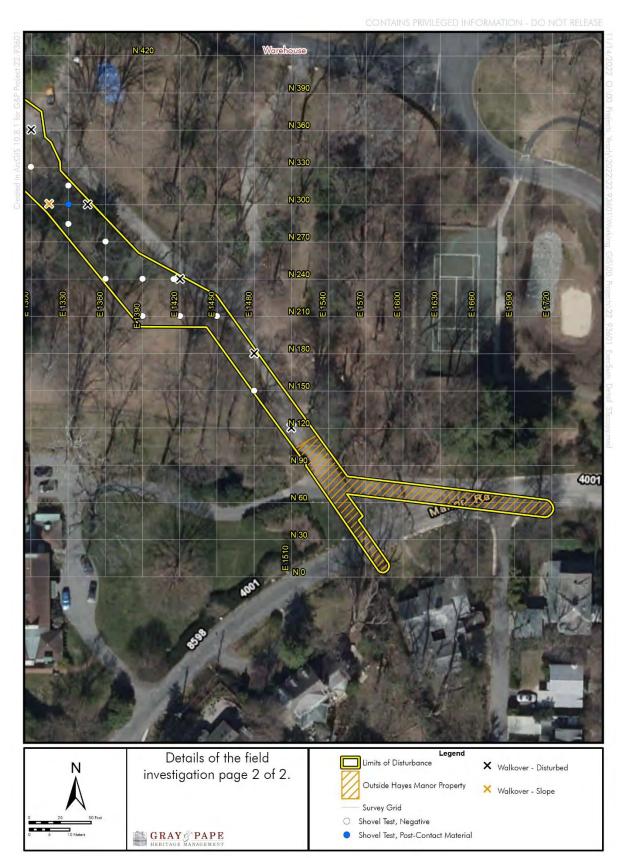


Figure 4. Detail of archaeology testing within southern portion of Hayes Manor.

Table 1. Quantities of artifacts recovered from the archaeological investigations.

Artifact Category	Count	Percentage
Architectural	67	56%
Ceramic	17	14%
Glass	13	11%
Historic Other	3	3%
Lithic	2	2%
Organic	12	10%
Personal	6	5%
Total	120	100%

The highest concentration of window glass was from a single STP, N330 E1045, located in the southwestern corner of the LOD. Recovered nails include a fairly even distribution of hand wrought and machine-cut nails with one nail having a machine-cut shaft with a hand wrought head. Only one ungalvanized wire nail was recovered. Additionally, a small cluster of machine-cut nails were located during the metal detector survey but as they were located outside of the LOD they were only noted and not collected. It nonetheless signifies a potential location for an outbuilding associated with the occupation of the property.



Figure 5. Sample of nails recovered during the archaeological investigations. From left, hand wrought nail and annealed machine-cut nail.

In terms of domestic materials, ceramics provided the most reliable temporal affiliations as much of the glass was too fragmentary to determine manufacture style. Recovered ceramics span the occupation of the property and include white salt-glazed stoneware, creamware, hard paste porcelain, redware, whiteware, and yellow ware (Figure 6). No determinations on specific activity areas were determined based on the types of ceramics recovered; however, tablewares were found in a slightly higher count than utilitarian vessels, such as crocks and milk pans.



Figure 6. Sample of ceramics recovered from archaeological investigations. From left: blue transferprinted whiteware, flow printed whiteware, and undecorated creamware.

The remaining materials consist of flowerpot fragments (cataloged as Historic Other), highly fragmentary animal bone, two pre-contact artifacts (an expended quartz core and a broken quartz flake), a Tombac button (Figure 7), a thimble fragment (Figure 8), a 1967 dime, a cast toy cap gun, and a celluloid Fender guitar pick from the 1960s.



Figure 7. Front and back of Tombac button recovered from archaeological investigations.



Figure 8. Thimble recovered from archaeological investigations.

Soils throughout the LOD were fairly uniform, with the exception of areas such as the gravel path (JM-1) in the north yard and the small strip along the western edge of the driveway (Figure 9 and Figure 10). A typical soil profile consists of a dark yellowish brown (10YR 4/4) silty loam A horizon overlaying a sterile subsoil of a strong brown (7.5YR 5/6) silty clay loam. Soil profiles are indicative of the landscape modifications that occurred on the property. The A horizon represents more recent development of this layer with no historic horizons overlaying the subsoil. The 1981 and 1982 historic aerials show what appears to be exposed ground surfaces in the south yard, likely representing some level of landscaping. Furthermore, along the western edge of the property, push piles were observed during the pedestrian survey which are also indicative of earth moving activities on the property.

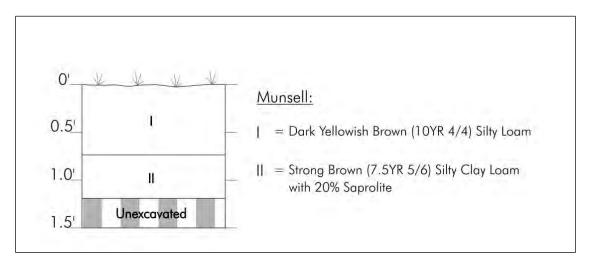


Figure 9. Profile for STP N360 E1060 located in the south yard.

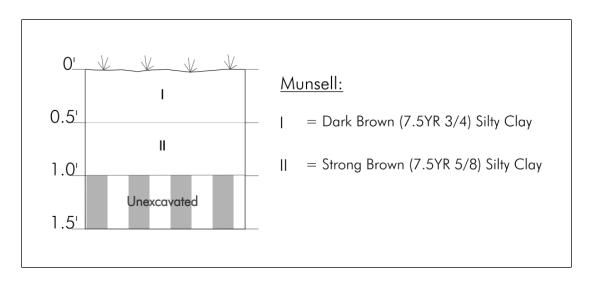


Figure 10. Profile for STP JM-1 located in the north yard.

5.0 SUMMARY AND RECOMMENDATIONS

Regardless of the identified disturbances to the LOD from buried utilities and general landscape modifications, the artifact concentrations coupled with the results of the geophysical survey indicate that the LOD may contain the remains of archaeological and historical features associated with previous outbuildings, activity areas, or landscape features. Four areas within the LOD are recommended for additional study in the form of test unit excavation (see Figure 3). These include the area adjacent to the southern porch, the southwestern portion of the LOD, the eastern portion of the LOD within the south yard, and an area in the north yard. All locations proposed for additional excavations have evidence of potential building features.

The geophysical survey of the southern porch showed additional layers of brick with stone pavers located beneath the surface. While these earlier elements of the porch are likely indicative of the midnineteenth century iteration of the porch, archaeological investigations could help confirm the overall construction and if other truncated deposits representative of the initial occupation are present. To fully capture any features in the area, one or two 3 by 5-foot (0.9 by 1.5-m) test units are recommended.

The second location is within the southwestern portion of the LOD. The geophysical study suggests the remains of a truncated outbuilding may be located in this area, approximately 0.8 feet (0.25 m) below ground surface. Additionally, this general portion of the LOD had the highest concentration of architectural debris and was also in close proximity to where the thimble fragment was recovered. As with the first location it is recommended that up to three larger test units (5 by 5-foot [1.5 by 1.5-m]) be excavated in this area, to fully explore the archaeological deposits related to this potential outbuilding and any other associated features or deposits.

The third location is in the eastern portion of the southern yard where metal detecting efforts recorded several cut nails and cut nail fragments. While the geophysical survey results did not indicate the presence of a building in this location, the archaeological deposits may represent either a destruction episode or an ephemeral structure. Two or three standard 3 by 3-ft (0.9 by 0.9-m) test unit in this location should provide additional data to verify whether an outbuilding previously was located in this area.

The fourth location for recommended placement of test units is in the north yard. This area may contain evidence of an 1817 icehouse, based on the geophysical data and historical data gathered by Robinson & Associates (2004) and SmithGroup (2022). One or two 3 by 5-foot (0.9 by 1.5-m) test unit could help confirm if this early-nineteenth century feature remains in the yard and fill deposits could offer information on when the icehouse was abandoned and filled.

In sum, up to 10 test units ranging in size from 3 by 3-ft (0.9 by 0.9-m) to 5 by 5-foot (1.5 by 1.5-m) are recommended to further explore the evolution of the landscape at Hayes Manor. The data gathered during these investigations could help identify features not discussed in historical documents and may also provide information that could suggest if the original main entrance to the home was once on the north side as opposed to the current southern entrance.

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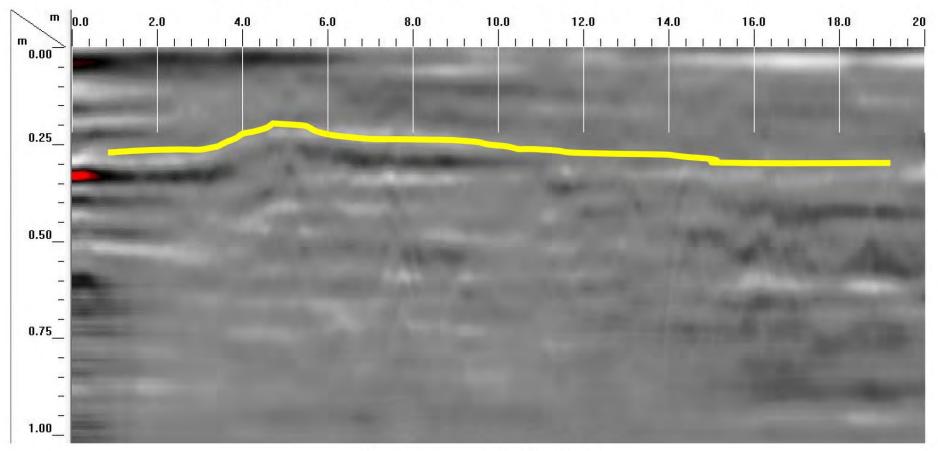
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APPENDIX I – GEOPHYSICAL SURVEY RESULTS

North Grid GPR Survey

Soil Horizon - Buried Surface ~0.25 m Below Surface

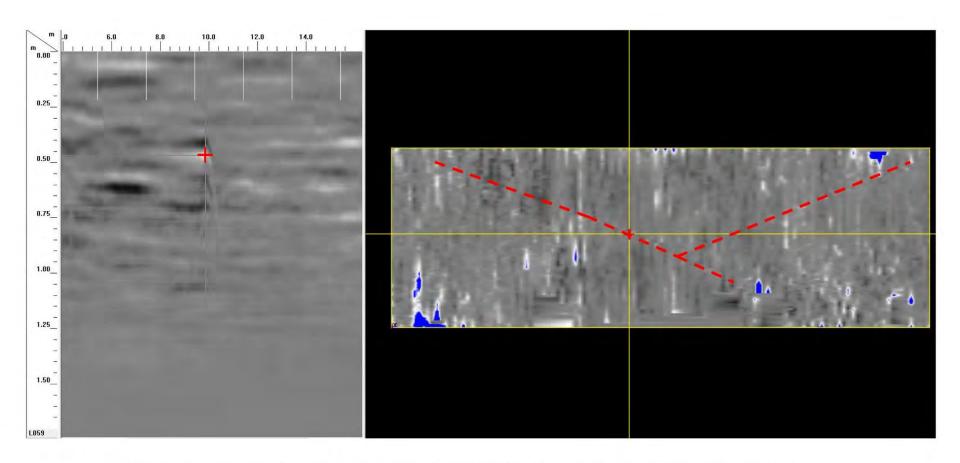


Radargram 025, X=12.0 m

Soil Horizon - Buried Surface ~0.25 m Below Surface



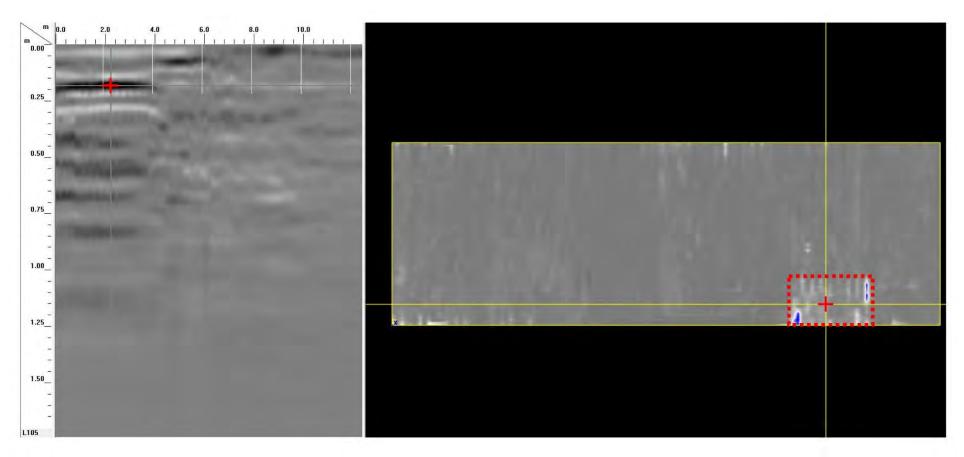
North Grid GPR Survey



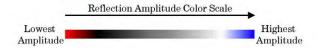
GPR Anomaly 1 ---- Buried Utility Lines 0.40-0.50 m in Depth



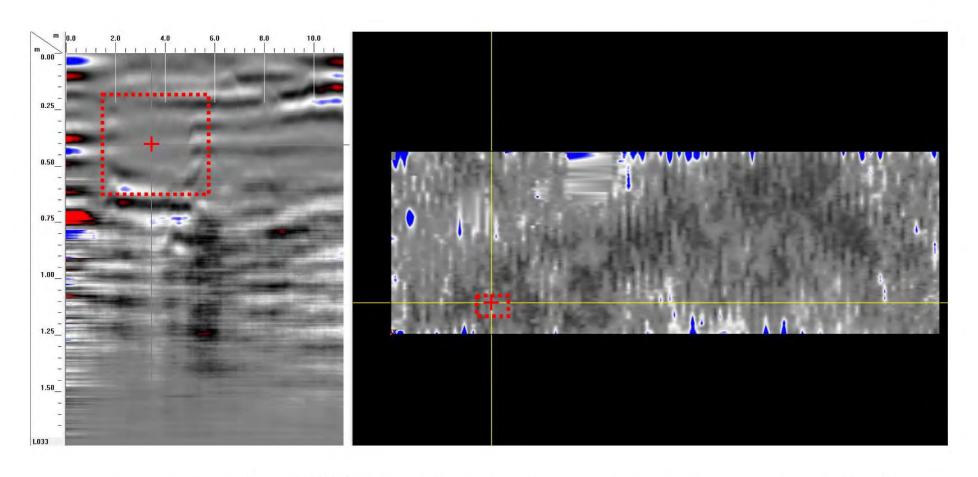
North Grid GPR Survey



GPR Anomaly 2 Buried Structure ~0.25 m in Depth, 8.5 x 5 m SW Corner 44.0 x 0.0m



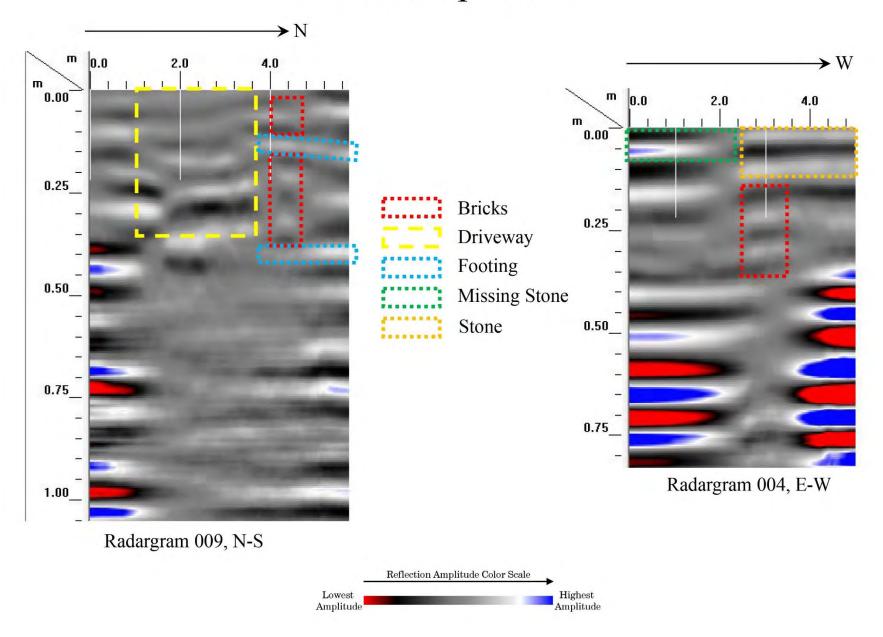
Southern Grid GPR Survey



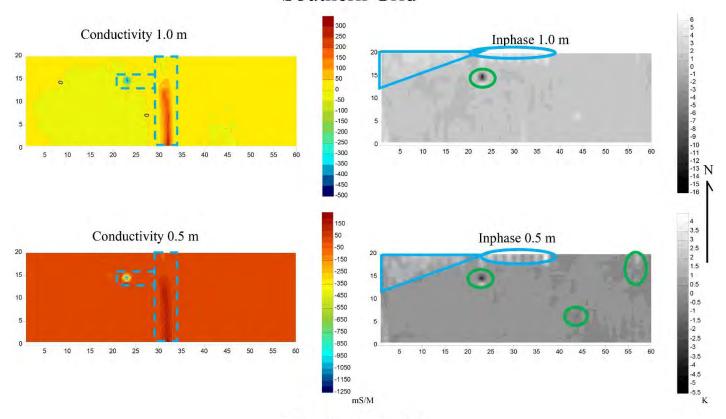
GPR Anomaly 3 Plausible Buried Structure ~0.25 -0.6 m in Depth, 2 x 2 m SW Corner 10.5 x 1.9m



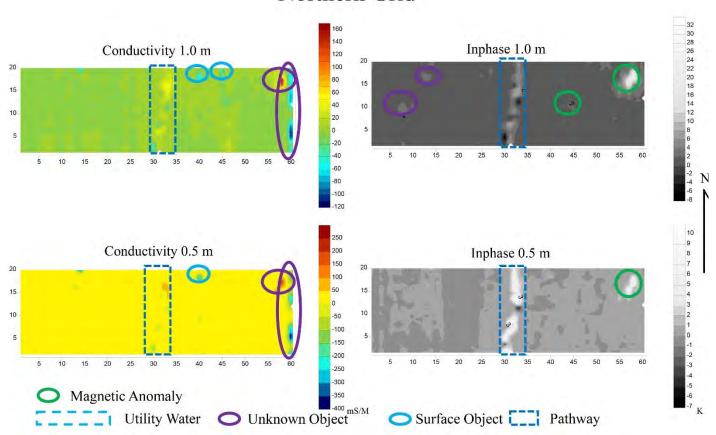
Southern Steps Area

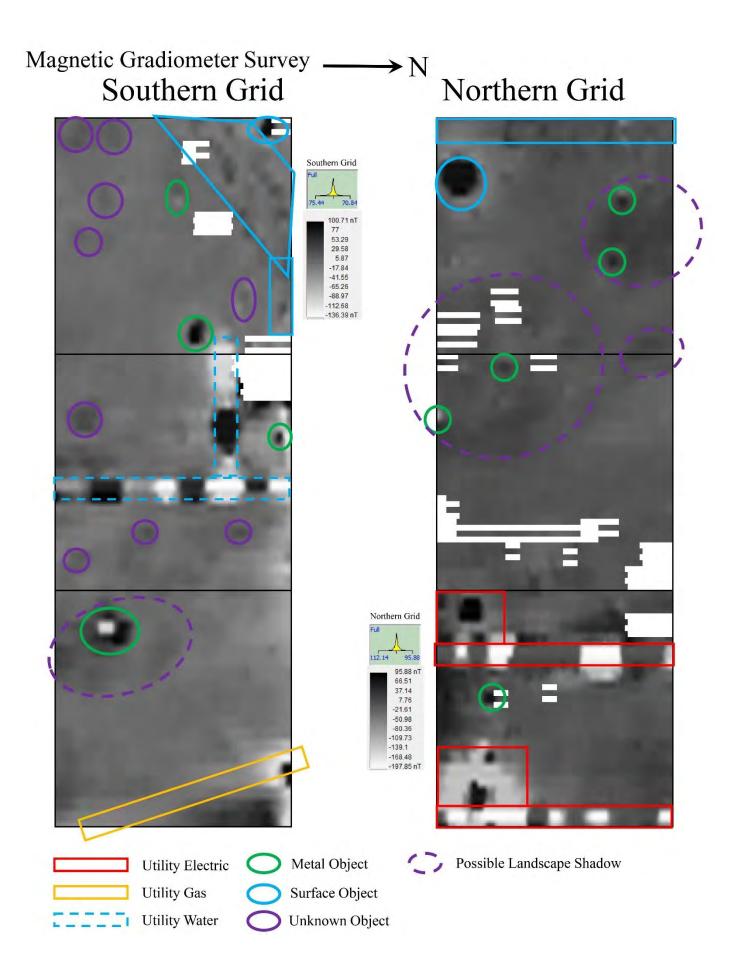


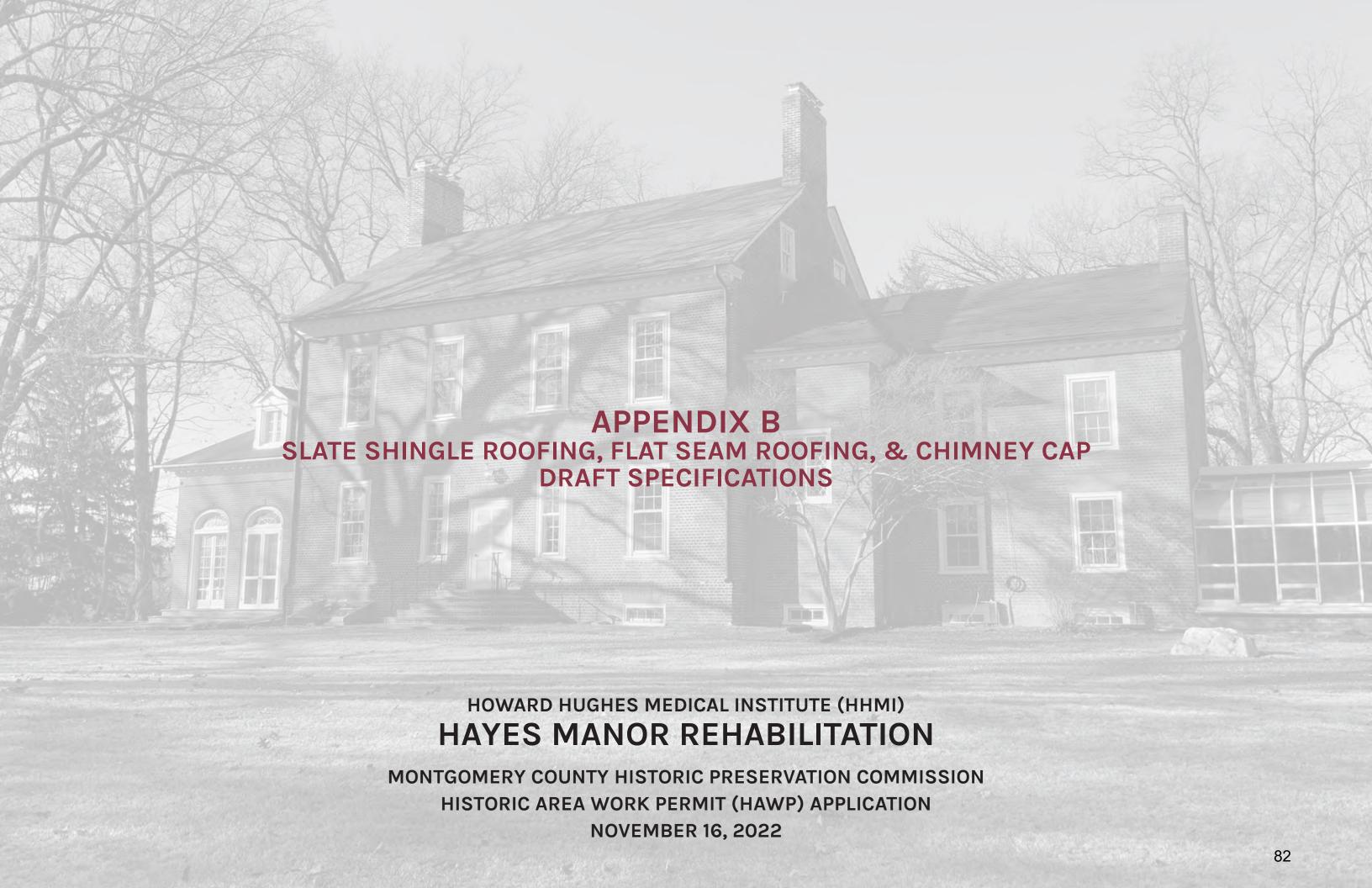
EM-38 Electrical Conductivity Meter Southern Grid



Northern Grid







SECTION 050374 - HISTORIC DECORATIVE METAL REPLICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes historic treatment of chimney caps in the form of replicating and installing historic items and whole assemblies.
- B. Related Requirements:
 - Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of decorative metal.
 - 2. Review methods and procedures related to historic treatment of decorative metal including, but not limited to, the following:
 - a. Historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.
 - c. Fire-protection plan.
 - d. Decorative metal historic treatment program.
 - e. Coordination with building occupants.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - Include plans, elevations, and sections showing locations and extent of replication work, with enlarged details of replacement parts indicating materials, profiles, methods of attachment, accessory items, and finishes.
 - 2. Include field-verified dimensions and the following:
 - a. Full-size patterns with complete dimensions for new decorative metal items and their jointing, showing relation of existing to new items.
 - b. Templates and directions for installing anchor bolts and other anchorages.
 - Identification of each new metal item and component and its location on the structure in annotated plans and elevations.
 - d. Provisions for expansion, weep holes, and conduits as required for each location and exposure.
 - e. Provisions for sealant joints if required.
- C. Samples for Initial Selection: For the following:
 - 1. Each type of decorative metal item and component with applied finishes.
 - 2. Sealant materials.
 - 3. Accessories to verify color selection.
- D. Samples for Verification: For the following products in manufacturer's standard sizes unless otherwise indicated, finished as required for use in the Work:
 - 1. Each type of new material to be used for replacing existing or missing decorative metal; 6 inches long in least dimension or whole item.
 - 2. Fittings and brackets.
 - Medallions.
 - Each type of exposed connection between components. Show method of finishing components at connections.
 - 5. Each type of exposed finish prepared on metal of the same alloy to be used for the Work of this Section: 6 inches long in least dimension.
 - 6. Sealant materials.
 - 7. Accessories: Each type of anchor, accessory, and miscellaneous support in required finishes.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For historic treatment specialist.
- B. Decorative Metal Historic Treatment Program: For replicating historic decorative metalwork.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents, including material, finish, source, and location on or in building.

1.7 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic decorative metal fabrication and installation specialist. Experience in torch or arc welding and installing and finishing new decorative metalwork is insufficient experience for decorative metal historic treatment work.
- B. Decorative Metal Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for historic treatment work, including each process or phase of replicating decorative metal, related work, and the protection of surrounding materials and Project site.
 - If materials and methods other than those indicated are proposed for any phase of historic treatment work, add a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project.
- C. Mockups: Prepare mockups of historic treatment replication and installation processes on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation. Prepare mockups so they are inconspicuous.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Pack, deliver, and store decorative metal items in suitable packs, heavy-duty cartons, or wooden crates; surround with sufficient packing material to ensure that products are not deformed, cracked, or otherwise damaged.
- B. Store decorative metal inside a well-ventilated area, away from uncured concrete and masonry and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.
- C. Protect strippable protective covering on decorative metal from exposure to sunlight and high humidity, except to the extent necessary for the period of decorative metal installation.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with historic treatment of decorative metal only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. General: Provide decorative metal materials made of the alloys, forms, and types that match existing metals and have the ability to receive finishes matching existing finishes unless otherwise indicated. Exposed-to-view surfaces exhibiting imperfections inconsistent with existing materials are unacceptable.
- B. Source Limitation for Replacement Cast Materials: Obtain castings for historic treatment of decorative metal from single source from single manufacturer with resources to provide materials of consistent quality in appearance and physical properties.
- C. Steel: Standard and grade designated below for each form required:
 - 1. Steel Plate, Shapes, and Bars: ASTM A 36/A 36M.
 - 2. Steel Bars: Mild steel; ASTM A 29/A 29M, Grade 1010.

3. Steel Sheet: ASTM A 1008/A 1008M, cold-rolled commercial steel sheet; matte finish; suitable for exposed applications.

2.2 PROTECTIVE COATING MATERIALS

A. Organic Coating: Clear, waterborne, air-drying, acrylic lacquer called "Incralac"; specially developed for coating copper-alloy products; consisting of a solution of methyl methacrylate copolymer with benzotriazole UV inhibitor.

2.3 MISCELLANEOUS MATERIALS

- A. Anchors: types indicated on Drawings with bolt heads of same basic metal as fastened metal unless otherwise indicated. Use metals that are noncorrosive and compatible with each metal anchored.
 - Strength: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488 conducted by a qualified independent testing agency.

B. Sealant Materials:

- 1. Provide manufacturer's standard, elastomeric single-component, nonsag urethane ealant complying with applicable requirements in Section 079200 "Joint Sealants."
- Colors: Provide colors of exposed sealants to match colors of metals in which sealant is placed unless otherwise indicated.
- C. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:
 - 1. Consistency of each application.
 - 2. Uniformity of the resulting overall appearance.
 - 3. Do not use products or tools that could do the following:
 - a. Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in the Contract.
 - b. Leave an unintended residue on surfaces.

2.4 METAL FABRICATION

- A. Fabricate decorative metal items and components in sizes and profiles to match existing decorative metal, with accurate curves, lines, and angles. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
- B. Provide uniform, neat seams with minimum exposure of welds, brazing, solder, and sealant.
- C. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for fasteners. Use concealed fasteners where possible; use exposed fasteners to match existing work.
- D. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
 - Use materials and methods that match color of base metal, minimize distortion, and develop maximum strength and corrosion resistance.
 - 2. Remove flux immediately.
 - 3. At exposed connections, match contours of adjoining surfaces, and finish exposed surfaces smooth and blended so no roughness shows after finishing.
- E. Date Identification: Emboss on a concealed, interior surface of the metal body of each new component, in easily read characters, "MADE 2020." Manufacturer's name may also be embossed. For malleable metals, stamp identification with an imprinting tool.

2.5 FINISHES, GENERAL

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 FERROUS METAL FINISHES

- A. Primer: Complying with applicable requirements in Section 090391 "Historic Treatment of Plain Painting" for finish painting of primed decorative metal.
- B. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 HISTORIC DECORATIVE METAL REPLICATION, GENERAL

- A. Replication Appearance Standard: Replicated surfaces are to have a uniform appearance as viewed from 50 feet away by Architect.
- B. Execution of the Work: In replicating historic items, disturb remaining existing work as minimally as possible and as follows:
 - 1. Sequence work to minimize time before protective coatings are applied.
 - 2. Replace or reproduce historic items where indicated or scheduled.
 - 3. Make installation of replicated items reversible whenever possible.
- C. Replicate Decorative Metal Item: Where indicated, duplicate existing items with new materials matching existing materials and features.
 - Design heavily deteriorated or missing features of decorative metal with compatible materials, using surviving prototypes to create patterns or molds for duplicating.
 - 2. Do not use substitute materials unless otherwise indicated.
 - 3. Compatible substitute materials may be used.

3.2 PROTECTIVE COATING

- A. Protective Organic Coating: Apply organic coating to produce uniform appearance without runs or other surface imperfections.
 - 1. Clean and dry surface being coated.
 - 2. Apply two uniform coats by air-spray method per manufacturer's written instructions, with interim drying between coats
 - 3. Apply coating to a total dry film thickness of 1 mil

3.3 INSTALLATION

- A. Installing Sealant:
 - 1. After metal installation, keep joints to receive sealant dry and free of debris.
 - 2. Clean and prepare joint surfaces according to Section 079200 "Joint Sealants." Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
 - 3. Fill sealant joints with specified joint sealant as recommended in writing by sealant manufacturer and according to Section 079200 "Joint Sealants" and the following:
 - a. Install sealant using only proved installation methods that ensure sealant is deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding metal.
 - 4. Cure sealant according to Section 079200 "Joint Sealants."

END OF SECTION

SECTION 073126 - SLATE SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Slate shingles.
 - 2. Underlayment materials.
 - 3. Ridge accessories.
 - 4. Metal flashing and trim.
- B. Disturbance of Existing Roofing:
 - Contact the Owner to determine the status of existing roofing warranty/maintenance agreement, and the firm(s) involved.
- C. Related Requirements:
 - Section 077253 "Snow Guards" for snow guards.

1.2 DEFINITIONS

A. Roofing Terminology: See ASTM D1079 for definitions of terms related to roofing Work in this Section.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Slate shingles.
 - 2. Underlayment materials.
 - 3. Ridge accessories.
 - 4. Asphalt roofing cement.
 - 5. Butyl sealant.
 - 6. Elastomeric sealant.
 - 7. Roofing asphalt.
 - 8. Cold-applied adhesive.
- B. Shop Drawings: For metal flashing and trim.
- C. Samples: For each exposed product and for each color and texture specified, in sizes indicated.
 - 1. Slate Shingles: Full size, of each color, size, texture, and shape.
 - 2. Metal Ridge Cap: 12-inch- long Sample.
- D. Samples for Initial Selection:
 - 1. For each type of slate shingle.
 - 2. For each type of accessory involving color selection.
- E. Samples for Verification: For the following products, in sizes indicated:
 - 1. Slate Shingle: Full size, of each color, size, texture, and shape.
 - 2. Metal Ridge Cap: 12-inch- long Sample.
 - Metal Valley Flashing: 12 inches square.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Slate Shingles: 100 sq. ft. of each size, type, and color, in unbroken bundles.

1.6 QUALITY ASSURANCE

- A. Provide the following upon request:
 - 1. Material Test Reports: For each slate variety, by a qualified testing agency.
 - 2. Research Reports: From **ICC-ES**, indicating that product is suitable for intended use under applicable building codes for the following:
 - a. Polymer-modified bitumen sheet underlayment.
 - b. Synthetic underlayment.

- SMITHGROUP: #13808
 - B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups for slate shingles including related roofing materials.
 - a. Size: 48 inches long by 48 inches wide.
 - b. Include gutter and downspout complying with requirements in Section 076200 "Sheet Metal Flashing and Trim."
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store underlayment rolls in a dry, well-ventilated location protected from weather, sunlight, and moisture in accordance with manufacturer's written instructions.
 - 1. Store on end, on pallets or other raised surfaces.
 - Do not double-stack rolls.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.
- C. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit product installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.
 - Install self-adhering, polymer-modified bitumen sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.9 WARRANTY

- A. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of slate-shingle roofing that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of product from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide slate shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

2.3 SLATE SHINGLES

- A. Slate Shingles: ASTM C406/C406M, Grade S1; hard, dense, and sound; with chamfered edges and nail holes machine punched or drilled and countersunk; with no broken or cracked slates, no broken exposed corners, and no broken corners on covered ends that could sacrifice nailing strength or laying of a watertight roof.
 - Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Slate Company.
 - b. Black Diamond Slate.
 - c. Buckingham-Virginia Slate Corp.
 - d. Evergreen Slate Company, Inc.
 - e. Greenstone Slate Company, Inc.
 - f. New England Slate.

- g. North Country Slate.
- h. Sheldon Slate Products Company, Inc.
- i. Slate International, Inc.
- j. Structural Slate Company (The).
- k. Vermont Structural Slate Company, Inc.
- I. Virginia Slate Company.
- m. Williams & Sons Slate & Tile, Inc.
- 2. Thickness and Surface Texture: Match existing shingle thickness.
- 3. Length: Match existing shingle length.
- 4. Width: Match existing shingle width.
- 5. Nail Holes: Four per shingle.
- 6. Butt Shape: Standard square cut to match existing .
- 7. Color: Match existing shingle color.
- B. Starter Slate: Slate shingles with chamfered nail holes front-side punched.
 - Length: Exposure of slate shingle plus headlap.

2.4 UNDERLAYMENT MATERIALS

- A. Synthetic Underlayment: UV-resistant polypropylene, polyolefin, or polyethylene polymer fabric with surface coatings or treatments to improve traction underfoot and abrasion resistance; recommended, in writing, by manufacturer for use under slate shingles; and evaluated and documented to be suitable for use as a roof underlayment under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - Building Products of Canada Corp.
 - b. Certainteed; SAINT-GOBAIN.
 - c. Drexel Metals; Carlisle Construction Materials.
 - d. G.A.P. Roofing, Inc.
 - e. GAF.
 - f. Malarkey Roofing.
 - g. Owens Corning.
 - h. SDP Advanced Polymer Products Inc.
 - i. SystemComponents Corporation.
 - . Tamko Building Products, Inc.
- B. Self-Adhering, Polymer-Modified Bitumen Sheet, High Temperature: ASTM D1970/D1970M, minimum 50-mil- thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied. **Provide primer for adjoining concrete, masonry, and metal surfaces to receive underlayment.**
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - ALCO Products LLC.
 - b. Atlas Roofing Corporation Polviso.
 - c. Carlisle WIP Products; a brand of Carlisle Construction Materials.
 - d. Certainteed; SAINT-GOBAIN.
 - e. Drexel Metals; Carlisle Construction Materials.
 - f. GCP Applied Technologies Inc.
 - g. Henry Company.
 - h. Malarkey Roofing.
 - i. SDP Advanced Polymer Products Inc.
 - 2. Thermal Stability: Stable after testing at 240 deg F in accordance with ASTM D1970/D1970M.

2.5 ACCESSORIES

- A. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.
- B. Elastomeric Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant; of class and use classifications required to seal joints in slate-shingle roofing and remain watertight; recommended in writing by manufacturer for applications indicated.

- SMITHGROUP: #13808
 - C. Cold-Applied Adhesive: Manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with underlayments.
 - D. Slating Nails: ASTM F1667, copper silicon-bronze cut-brass, smooth-shanked, wire nails; 0.135-inch-minimum thickness; sharp pointed; with 3/8-inch-minimum diameter flat head; of sufficient length to penetrate a minimum of 3/4 inch into sheathing or extend at least 1/8 inch through sheathing less than 3/4 inch thick.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
 - E. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch- minimum diameter.
 - 1. Provide with minimum 0.0134-inch- thick metal cap, 0.010-inch- thick power-driven metal cap, or 0.035-inch- thick plastic cap; and with minimum 0.083-inch- thick ring shank or 0.091-inch- thick smooth shank of length to penetrate at least 3/4 inch into roof sheathing or to penetrate through roof sheathing less than 3/4 inch thick.
 - F. Nailer Strips: Comply with requirements in Section 061000 "Rough Carpentry."
 - G. Nails for Wood Strips: ASTM F1667; common or box, steel wire, flat head, and smooth shank; hot-dip galvanized.

2.6 METAL FLASHING AND TRIM

- A. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
 - 1. Sheet Metal: Copper.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for design, dimensions, metal, and other characteristics of the item unless otherwise specified in this Section or indicated on Drawings.
 - 1. Apron Flashings: Fabricate with lower flange extending a minimum of 6 inches over and 4 inches beyond each side of downslope slate shingles and 6 inches up the vertical surface.
 - 2. Stép Flashings: Fabricate with a headlap of 3 inches and a minimum extension of 5 inches both horizontally and vertically.
 - 3. Cricket and Backer Flashings: Fabricate with concealed flange extending a minimum of 24 inches beneath upslope slate shingles, 6 inches beyond each side of chimney, and 6 inches above the roof plane.
 - 4. Counterflashings: Fabricate to cover 4 inches of base flashing measured vertically; and in lengths required so that no step exceeds 8 inches and overall length is no more than 10 feet.
 - a. Provide metal receivers for installation.
 - 5. Hip Flashings: Fabricate to length of slate shingle and to extend 3 inches beyond joint of hip shingle with adjoining roof shingle.
 - 6. Open-Valley Flashings: Fabricate from metal sheet not less than 18 inches wide in lengths not exceeding 10 feet, with 1-inch- high, inverted-V profile water diverter at center of valley and equal flange widths of not less than 8 inches.
 - a. Hem flange edges for fastening with metal cleats.
 - 7. Drip Edges: Fabricate in lengths not exceeding 10 feet with roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
- C. Vent-Pipe Flashings: ASTM B749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through roofing.
 - 3. Verify that vent stacks and other penetrations through roofing are installed and securely fastened.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT MATERIALS

- A. Comply with slate-shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.
- B. Asphalt-Saturated Organic Felt: Install on roof deck parallel with and starting at eaves and fasten with underlayment nails.
 - 1. Single-Layer Installation:
 - a. Lap sides a minimum of 4 inches over underlying course.
 - b. Lap ends a minimum of 4 inches.
 - c. Stagger end laps between succeeding courses at least 72 inches.
 - 2. Double-Layer Installation:
 - Install a 19-inch- wide starter course at eaves and completely cover with a 36-inch- wide second course.
 - Install succeeding 36-inch- wide courses lapping previous courses 19 inches in shingle fashion.
 - c. Lap ends a minimum of 4 inches.
 - d. Stagger end laps between succeeding courses at least 72 inches.
 - Apply a continuous layer of asphalt roofing cement over starter course and on felt surface to be concealed by succeeding courses as each felt course is installed. Apply at locations indicated on Drawings.
 - 3. Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.
 - 4. Install felt over areas protected by self-adhering, polymer-modified bitumen sheet.
 - 5. Terminate felt extended up not less than 4 inches against sidewalls, curbs, chimneys, and other roof projections.
- C. Synthetic-Underlayment Top Layer: Install in accordance with manufacturer's written installation instructions and as second layer over anchor-layer underlayment.
 - 1. Completely cover anchor-layer underlayment and install parallel with and starting at the eaves, with side laps offset halfway between side laps of underlying anchor layer.
 - 2. Lap sides and ends as recommended in writing by manufacturer, but not less than 4 inches for side laps and 6 inches for end laps.
 - 3. Stagger end laps from anchor-layer end laps and between succeeding top courses at interval recommended in writing by manufacturer, but not less than 72 inches.
 - 4. Fasten with underlayment nails.
 - 5. Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.
- D. Polymer-Modified Bitumen Sheet: Install parallel with and starting at eaves.
 - 1. Single- or Anchor-Layer Installation:
 - a. Install on roof deck.
 - b. Lap sides a minimum of 4 inches over underlying course.
 - c. Lap ends a minimum of 6 inches.
 - d. Stagger end laps between succeeding courses at least 72 inches.
 - e. Fasten with underlayment nails.
 - 2. Top-Layer Installation:
 - a. Install as a second layer over anchor-layer underlayment.
 - Completely cover anchor layer, with side laps offset halfway between side laps of underlying anchor layer.
 - c. Lap sides a minimum of 4 inches.
 - d. Lap ends a minimum of 6 inches.
 - e. Stagger end laps from anchor-layer end laps and between succeeding top-layer courses at least 72 inches.
 - f. Adhere to anchor layer in uniform coating of cold-applied adhesive.
 - 3. Double-Layer Installation:
 - a. Install on roof deck in overlapping layers with a half-width plus 1-inch- wide starter course at eaves completely covered by full-width second course.

- Install succeeding courses lapping previous courses by a half-width plus 1 inch in shingle fashion.
- c. Lap ends a minimum of 6 inches.
- d. Stagger end laps between succeeding courses at least 72 inches.
- e. Fasten with underlayment nails.
- 4. Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.
- 5. Install sheets over areas protected by self-adhering, polymer-modified bitumen sheet.
- 6. Terminate sheets **extended up not less than** 4 inches against sidewalls, curbs, chimneys, and other roof projections.
- E. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free.
 - 1. Comply with low-temperature installation restrictions of underlayment manufacturer.
 - 2. Install lapped in direction that sheds water. Lap sides not less than 4 inches.
 - 3. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses.
 - 4. Roll laps with roller.
 - Prime concrete, masonry, and metal surfaces to receive self-adhering, polymer-modified bitumen sheet.
 - 6. Single- or Anchor-Layer Installation: Install over entire roof deck.
 - Top-Layer Installation: Install as second layer over anchor-layer underlayment.
 - a. Completely cover anchor-layer underlayment.
 - b. Offset side laps halfway between side laps of underlying anchor layer and offset end laps from those of underlying anchor layer at least 72 inches.
 - 8. Water and Ice-Dam Protection Installation: Install on roof deck where indicated below.
 - a. Eaves: Extend from edges of eaves 36 inches beyond interior face of exterior wall.
 - b. Rakes: Extend from edges of rakes 36 inches beyond interior face of exterior wall.
 - c. Valleys: Extend from lowest to highest point 18 inches on each side of centerline.
 - d. Hips: Extend 18 inches on each side.
 - e. Ridges: Extend 36 inches on each side without obstructing continuous ridge vent slot.
 - f. Sidewalls: Extend 18 inches beyond sidewalls and return vertically against sidewalls not less than 4 inches.
 - g. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend 18 inches beyond penetrating elements and return vertically against penetrating elements not less than 4 inches.
 - h. Roof-Slope Transitions: Extend 18 inches on each roof slope.
 - 9. Cover underlayment within seven days.
- F. Valley Underlayment: Install one layer of 36-inch- wide underlayment centered in valley, running full length of valley, and on top of underlayment on field of roof that is woven through valley. Install all layers of underlayment in and through valley tight with no bridging.
 - 1. Use same underlayment as installed on field of roof.
 - 2. Lap ends at least 12 inches in direction that sheds water, and seal with asphalt roofing cement.
 - 3. Fasten to roof deck with underlayment nails located as far from valley center as possible and only to extent necessary to hold underlayment in place until installation of valley flashing.

3.3 INSTALLATION OF METAL FLASHING AND TRIM

- A. Install metal flashings and other sheet metal to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
 - Install metal flashings in accordance with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems."
- B. Apron Flashings: Extend lower flange over and beyond each side of downslope slate shingles and up the vertical surface.
- C. Step Flashings: Install with a headlap of 3 inches and extend both horizontally and vertically. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying slate shingle. Fasten to roof deck only.
- D. Cricket and Backer Flashings: Install against roof-penetrating elements, extending concealed flange beneath upslope slate shingles and beyond each side.
- E. Counterflashings: Coordinate with installation of base flashing and fit tightly to base flashing. Lap joints a minimum of 4 inches secured in a waterproof manner.

- 1. Install in reglets or receivers.
- F. Hip Flashings: Install centered over hip with lower edge of flashing concealed by butt of overlying slate shingle. Fasten to roof deck.
- G. Open-Valley Flashings: Install centered in valleys, lapping ends at least 8 inches in direction that sheds water.
 - 1. Fasten upper end of each length to roof deck beneath overlap.
 - 2. Secure hemmed flange edges into metal cleats spaced 12 inches apart and fastened to roof deck.
 - 3. Adhere minimum 9-inch- wide strips of self-adhering, polymer-modified bitumen sheet to metal flanges and to underlying self-adhering, polymer-modified bitumen sheet. Place strips parallel to and over flanges so that they will be just concealed by installed shingles.
 - 4. Provide a closure at the end of the inverted-V profile of the valley metal to minimize water and ice infiltration.
- H. Rake Drip Edges: Install over underlayment materials and fasten to roof deck.
- I. Eave Drip Edges: Install over wood cant strip and under underlayment materials; fasten to roof deck.
- J. Pipe Flashings: Form flashing around pipe penetrations and slate shingles. Fasten and seal to slate shingles.

3.4 INSTALLATION OF SLATE SHINGLES

- A. Beginning at eaves, install slate shingles in accordance with manufacturer's written instructions and with details and recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems."
 - 1. Install wood strip cant at eave edges under underlayment materials.
 - 2. Install shingle starter course chamfered face down.
- B. Install first and succeeding shingle courses chamfered face up. Install full-width first course at rake edge.
 - 1. Offset joints of uniform-width slate shingles by half the shingle width in succeeding courses.
 - 2. Offset joints of random-width slate shingles a minimum of 3 inches in succeeding courses.
- C. Maintain a 4-inch minimum headlap between succeeding shingle courses.
- D. Maintain uniform exposure of shingle courses midway between eaves and ridge, and increase headlap of succeeding shingle courses to ensure uniform exposure on remaining shingle courses.
- E. At eaves, extend shingle starter course and first course 1 inch over fasciae.
- F. At rakes, extend shingle starter course and succeeding courses 2 inches over fasciae.
- G. Cut and fit slate neatly around roof vents, pipes, ventilators, and other projections through roof.
- H. Hang slate with four slating nails for each shingle, with nail heads lightly touching slate.
 - 1. Do not drive nails home, which draws slates downward, and do not leave nail heads protruding enough to interfere with the overlapping shingle above.
 - At vented ridges, terminate slate shingles to produce a uniform airspace on each side of ridge apex.
- I. Ridges: Install ridge slate in configuration match existing configuration.
 - 1. Install and anchor wood nailer strips of thicknesses to match abutting courses of slate shingles, terminating nailer strip 3 to 4 inches from the eave. Cover with self-adhering, polymer-modified bitumen sheet, extending to underlying slate but concealed by ridge slate.
 - 2. Lay ridge slate in bed of asphalt roofing cement or butyl sealant.
 - 3. Anchor ridge slate to supporting wood nailer strip with four nails for each slate shingle, without nails penetrating underlying slate.
 - 4. Extend combed-ridge slate over leeward ridge slate by 1/8 to 1/4 inch. Seal ridge joint with elastomeric sealant.
 - 5. Cover heads of exposed nails at final ridge shingle with asphalt roofing cement or butyl sealant.
- J. Open Valleys: Cut slate shingles to form straight lines at open valleys, trimming upper concealed corners of shingles. Maintain uniform width of exposed open valley from highest to lowest point.
 - 1. Do not nail shingles to valley metal flashings.
- K. Remove and replace damaged or broken slate shingles.

3.5 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:
 - 1. Owner: < Insert name of Owner>.
 - 2. Owner Address: < Insert address>.
 - 3. Building Name/Type: < Insert information>.
 - Building Address: <Insert address>.
 - 5. Area of the Work: < Insert information>.
 - 6. Acceptance Date: < Insert date>.
 - 7. Warranty Period: < Insert time>.
 - Expiration Date: <Insert date>.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that, during Warranty Period, Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
 - Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding < Insert wind speed> mph;
 - c. Fire;
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. Faulty construction of copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 - 2. When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 - Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
 - 4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.
 - 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.
 - 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.

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 - 7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.
 - E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.
 - 1. Authorized Signature: < Insert signature >.
 - 2. Name: <Insert name>.
 - 3. Title: <Insert title>.

END OF SECTION 073126

HOWARD HUGHES MEDICAL INSTITUTE
HAYES MANOR REHABILITATION
ISSUED FOR CONSTRUCTION DOCUMENTS
18 NOVEMBER 2022

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SECTION 076100 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- Section Includes: Α.
 - Flat-seam metal roofing, custom fabricated.
- B. Related Requirements:
 - Division 07 Section "Thermal Insulation" for roof insulation and sheet vapor retarders separate from 1. self-adhering underlayments.
 - Division 07 Section "Roof Specialties" for manufactured fasciae that are not part of sheet metal 2. roofina.
 - 3. Division 07 Section "Roof Accessories" for manufactured roof accessories.
 - 4. Division 077253 "Snow Guards" for snow guards.
 - Division 07 Section "Joint Sealants" for field-applied sealants adjoining sheet metal roofing.

1.2 **ACTION SUBMITTALS**

- Product Data: For each type of product indicated. Include construction details, material descriptions, A. dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal roofing, including plans, elevations, expansion joint locations, and keyed details. Distinguish between shop- and field-assembled Work. Include the following:
 - Details for forming sheet metal roofing, including seams and dimensions. 1.
 - Details for joining and securing sheet metal roofing, including layout of fasteners, cleats, clips, and 2. other attachments. Include pattern of seams.
 - Details of termination points and assemblies, including fixed points. 3.
 - Details of expansion joints, including showing direction of expansion and contraction. 4.
 - Details of roof penetrations. 5.
 - Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings. 6.
 - 7. Details of special conditions.
 - Details of connections to adjoining work. 8.
 - Detail the following accessory items, at a scale of not less than 6 inches per 12 inches:
 - a. Flashing and trim.
 - b. Gutters and downspouts as they relate to adjacent sheet metal roofing.
 - Snow guards. c.
- C. Samples for Initial Selection: For each type of sheet metal roofing indicated, with factory-applied color finishes.
 - Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Sheet Metal Roofing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, and other attachments.
 - 2. Trim and Metal Closures: 12 inches long and in required profile. Include fasteners and other exposed accessories.
 - 3. Snow Guards: Full-size Sample.
 - Other Accessories: 12-inch- long Samples for each type of other accessory.

1.3 **INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Roof plans drawn to scale with coordinated details for penetrations and roof-mounted items. Show the following:
 - Sheet metal roofing and attachments. 1.
 - Roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, 2. lighting fixtures, snow guards, and items mounted on roof curbs.

1.4 **CLOSEOUT SUBMITTALS**

A. Maintenance Data: For roofing sheet metals and accessories to include in maintenance manuals.

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1.5 QUALITY ASSURANCE

- A. Custom-Fabricated Sheet Metal Roofing Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal roofing similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Roll-Formed Sheet Metal Roofing Fabricator Qualifications: Fabricator authorized by portable roll-forming equipment manufacturer to fabricate and install sheet metal roofing units required for this Project, and who maintains current UL certification of its portable roll-forming equipment.
- C. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing roofing panels for sheet metal roofing assemblies that comply with UL 580 for Class 90 wind-uplift resistance. Maintain UL certification of portable roll-forming equipment for duration of sheet metal roofing work.
- D. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- E. Provide the following upon request:
 - 1. Portable Roll-Forming Equipment Certificate: Issued by UL for equipment manufacturer's portable roll-forming equipment capable of producing panels which comply with UL requirements. Show expiration date no earlier than two months after scheduled completion of sheet metal roofing.
 - a. Submit certificates indicating recertification of equipment whose certification has expired during the construction period.
 - 2. Qualification Data: For qualified Installer and fabricator.
 - 3. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof area and eave, including fascia, as shown on Drawings; approximately 48 inches square by full thickness, including attachments, underlayment, and accessories.
 - 2. Build mockups for typical roof area only, including accessories.
 - a. Size: 12 feet long by 6 feet.
 - b. Each type of exposed seam and seam termination.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- G. Preliminary Roofing Conference: Before starting roof sheathing construction, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 01 Section "Project Management and Coordination."
 - 1. Review methods and procedures related to roof sheathing construction and sheet metal roofing including, but not limited to, items listed for the Preinstallation Conference.
- H. Preinstallation Conference: Conduct conference at Project site.
 - Meet with Owner, Architect, Owner's insurer if applicable, sheet metal roofing Installer, portable roll-forming equipment manufacturer's representative for sheet metal roofing, and sheathing Installer, and installers whose work interfaces with or affects sheet metal roofing including installers of roof accessories and roof-mounted equipment.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to sheet metal roofing installation , including portable roll-forming equipment manufacturer's written instructions.
 - 4. Examine sheathing conditions for compliance with requirements, including flatness and attachment to structural members.
 - 5. Review structural loading limitations of sheathing during and after roofing installation.
 - 6. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal roofing.
 - 7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
 - 8. Review temporary protection requirements for sheet metal roofing during and after roofing installation.
 - 9. Review roof observation and repair procedures after sheet metal roofing installation.

 Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal roofing materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal roofing installation.

1.7 COORDINATION

- Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in other Sections.
- B. Coordinate sheet metal roofing with rain drainage work, flashing, trim, and construction of sheathing, parapets, walls, and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.8 WARRANTY

- A. Special Warranty
 - Warrant metal roofing system against defective materials, workmanship and leaks, except leaks
 caused by abuse, lightning, hurricane, tornado, hail storm, unusual climatic phenomena or failure of
 related work installed by other parties.
 - 2. During the warranty period, restore defective Work to the standard of the Contract Documents, including all materials, labor, refinishing and other costs incidental to the Work. Within 24 hours after receipt of notice from the Owner, inspect the Work and immediately repair leaks. Restore Work found to be defective as defined in the Contract Documents within 10 days after receipt of notice from the Owner.
 - 3. Warranty shall be written on form at the end of this Section.
 - 4. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested in accordance with ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, clips, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim[, battens], underlayment, and accessories shall comply with requirements indicated without failure due to defective manufacture, fabrication, installation, or other defects in construction. Sheet metal roofing shall remain watertight.
- B. Thermal Movements: Provide sheet metal roofing that allows for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 ROOFING SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- Revere Copper Products, Inc.; FreedomGray.
- 2. Weight (Thickness): 20-oz./sq. ft. uncoated weight, with 0.787-mil coating thickness applied to each side.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
 - 3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. GCP Applied Technologies; Ultra.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
- B. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - General:
 - Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
 - b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - Fasteners for Steel Sheet: Hot-dip galvanized steel in accordance with ASTM A 153, ASTM F 2329, or Series 300 stainless steel.
 - Fasteners for Zinc-Tin Alloy-Coated Copper Sheet: Copper, hardware bronze, or Series 300 stainless steel.

C. Solder:

- For Zinc-Tin Alloy-Coated Copper: Lead free, Johnson #497 SuperFlo, with Johnson E-127 Flux-'N-Solder with Pure Tin.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant as recommended by portable roll-forming equipment manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. Underlayment Adhesive:
 - Cold-Applied Asphalt Adhesive: ASTM D3019, Type III, asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive, specially formulated for compatibility and use with underlayment.
 - Cold-Applied Polymer-Modified Asphalt Adhesive: Underlayment manufacturer's standard solvent-and asbestos-free, cold-applied adhesive, specially formulated for compatibility and use with underlayment.
 - 3. Verify adhesives and sealants comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 ACCESSORIES

- A. Sheet Metal Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.
 - Provide accessories as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.
 - 2. Cleats: For mechanically seaming into joints and formed from the following materials:
 - a. Zinc-Tin Alloy-Coated Copper Roofing: 16-oz./sq. ft. copper sheet.
 - 3. Clips: Minimum 0.0625-inch- thick, stainless-steel panel clips designed to withstand negative-load requirements.
 - 4. Backing Plates: Plates at roofing splices, fabricated from material recommended by SMACNA.
 - Closure Strips: Closed-cell, expanded, cellular, rubber or cross-linked, polyolefin foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible-closure strips; cut or pre-molded to match sheet metal roofing profile. Provide closure strips where indicated or necessary to ensure weather-tight construction.
 - Flashing and Trim: Formed from same material and with same finish as sheet metal roofing, minimum 0.018 inch thick.
- B. Pipe Flashing: Pre-molded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.6 FABRICATION

- A. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions (panel width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest extent possible.
 - 1. Flat-Seam Roofing: Form flat-seam panels from metal sheets 20 by 28 inches with 1/2-inch notched and folded edges.
- B. General: Fabricate roll-formed sheet metal roofing panels with UL-certified, portable roll-forming equipment capable of producing roofing panels for sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article. Fabricate roll-formed sheet metal in accordance with equipment manufacturer's written instructions and to comply with details shown.
- C. Fabrication Tolerances: Fabricate sheet metal roofing that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- D. Fabrication Tolerances: Fabricate sheet metal roofing that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- E. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks; true to line and levels indicated; and with exposed edges folded back to form hems.
 - Lay out sheet metal roofing so transverse seams, if required, are made in direction of flow with higher panels overlapping lower panels.
 - Offset transverse seams from each other 12 inches minimum.
 - 3. Fold and cleat eaves and transverse seams in the shop.
 - 4. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown on Drawings and as required for leak-proof construction.
- F. Expansion Provisions: Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- G. Sealant Joints: Where movable, non-expansion-type joints are indicated or required to produce weather-tight seams, form metal to provide for proper installation of elastomeric sealant in compliance with SMACNA standards or roof system manufacturer's recommendations.

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 - H. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of the metals in contact.
 - I. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.
 - Form exposed sheet metal accessories without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams: Fabricate non-moving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Seams: Fabricate non-moving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
 - 4. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant.
 - Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
 - J. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking, that tops of fasteners are flush with surface, and that installation is within flatness tolerances required for finished roofing installation.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored, and that provision has been made for drainage, flashings, and penetrations through sheet metal roofing.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Examine roughing-in for components and systems penetrating sheet metal roofing to verify actual locations of penetrations relative to seam locations of sheet metal roofing before installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Lay out and screw battens to wood sheathing before installation of sheet metal roofing.
 - 1. Space fasteners not more than 18 inches o.c.
 - Space fasteners as required by portable roll-forming equipment manufacturer for specified UL classification for wind-uplift resistance.

3.3 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under sheet metal roofing. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply at locations indicated, in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Roof perimeter for a distance up from eaves of 24 inches beyond interior wall line.
 - 2. Valleys, from lowest to highest point, for a distance on each side of 18 inches. Overlap ends of sheets not less than 6 inches.
 - 3. Rake edges for a distance of 18 inches.

- 4. Hips and ridges for a distance on each side of 12 inches.
- 5. Roof to wall intersections for a distance from wall of 18 inches.
- Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of 18 inches.
- B. Install flashings to cover underlayment to comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."

3.4 INSTALLATION, GENERAL

- A. General: Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
 - 1. Field cutting of sheet metal roofing by torch is not permitted.
 - 2. Provide metal closures at and each side of ridge caps.
 - 3. Flash and seal sheet metal roofing with closure strips at eaves, rakes, and perimeter of all openings. Fasten with self-tapping screws.
 - Locate and space fastenings in uniform vertical and horizontal alignment. Pre-drill panels for fasteners.
 - 5. Install ridge caps as sheet metal roofing work proceeds.
 - 6. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition. Install backing plates at roofing splices.
 - 7. Install sealant tape where indicated.
 - 8. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.
 - 9. Do not use graphite pencils to mark metal surfaces.
- B. Thermal Movement. Rigidly fasten metal roof panels to structure at only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction.
 - Point of Fixity: Fasten each panel along a single line of fixing located at locations indicated on Drawings.
 - 2. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.
- C. Fasteners: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by SMACNA.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Fasciae: Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal sheet metal roofing with closure strips where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.5 CUSTOM-FABRICATED SHEET METAL ROOFING INSTALLATION

- A. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form a hem on concealed side of exposed edges unless otherwise indicated.
 - 1. Install cleats to hold sheet metal panels in position. Attach each cleat with two fasteners to prevent rotation
 - 2. Fasten cleats not more than 12 inches o.c. Bend tabs over fastener head.
 - 3. Provide expansion-type cleats and clips for roof panels that exceed 30 feet in length.
- B. Seal joints as shown and as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

- Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants "
- C. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
 - Do not solder sheet.
 - 2. Do not pre-tin zinc-tin alloy-coated copper.
 - 3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- D. Rivets: Rivet joints in where indicated and where necessary for strength.
- E. Flat-Seam Roofing: Attach flat-seam metal panels to substrate with cleats, starting at eave and working upward toward ridge. After panels are in place, mallet seams and solder.
 - 1. Attach rooting panels with cleats spaced not more than 24 inches o.c. Lock and solder panels to base flashing.
 - 2. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at 12 inches o.c. Lock panels to edge flashing and solder.

3.6 ON-SITE, ROLL-FORMED SHEET METAL ROOFING INSTALLATION

- A. General: Install on-site, roll-formed sheet metal roofing fabricated from UL-certified equipment to comply with equipment manufacturer's written instructions for UL wind-uplift resistance class indicated. Provide sheet metal roofing of full length from eave to ridge unless otherwise restricted by on-site or shipping limitations.
- B. Standing-Seam Sheet Metal Roofing: Fasten sheet metal roofing to supports with concealed clips at each standing-seam joint at location, at spacing, and with fasteners recommended by manufacturer of portable roll-forming equipment.
 - 1. Install clips to substrate with self-tapping fasteners.
 - Install pressure plates at locations indicated in equipment manufacturer's written installation instructions.
 - 3. Before panels are joined, apply continuous bead of sealant to top of flange of lower panel.
 - 4. Snap-On Seam: Nest standing seams and fasten together by interlocking and completely engaging field-applied sealant.
 - 5. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so cleat, sheet metal roofing, and field-applied sealant are completely engaged.
- C. Seal joints as shown and as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 - Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.7 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weather-tight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
 - 2. Install accessories integral to sheet metal roofing that are specified in Division 07 Section "Sheet Metal Flashing and Trim" to comply with that Section's requirements.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - Install flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.

- 2. Install continuous strip of self-adhering underlayment at edge of continuous flashing overlapping self-adhering underlayment, where "continuous seal strip" is indicated in SMACNA's "Architectural Sheet Metal Manual," and where indicated on Drawings.
- 3. Install exposed flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
- 4. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, and filled with butyl sealant concealed within joints.
- C. Pipe Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended by SMACNA.

3.8 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal roofing within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inchoffset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal roofing within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.9 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal roofing installation, clean finished surfaces as recommended by sheet metal roofing manufacturer. Maintain sheet metal roofing in a clean condition during construction.
- E. Replace sheet metal roofing components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.10 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS < Insert name > of < Insert address > , herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: < Insert name of Owner>.
 - 2. Address: < Insert address>.
 - 3. Building Name/Type: < Insert information >.
 - 4. Address: < Insert address>.
 - 5. Area of Work: < Insert information>.
 - 6. Acceptance Date: < Insert date >.
 - 7. Warranty Period: <Insert time>.
 - Expiration Date: <Insert date>.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
 - Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

a. Lightning;

- b. Peak gust wind speed exceeding < Insert wind speed > mph;
- c. Fire
- d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
- e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
- f. Vapor condensation on bottom of roofing; and
- g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
- 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
- Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
- 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
- 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
- 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
- 7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work in accordance with requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.
- E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.
 - 1. Authorized Signature: < Insert signature>.
 - 2. Name: < Insert name >.
 - 3. Title: <Insert title>.

END OF SECTION

Special Roof System Warranty follows.

	ARRANTY FORM ontractor's Job Number: n description if less than full roof):
requirements of the Contract without failure for the above s starting on , 20, ar	years rrant that the above stated Work has been executed in conformance with the Documents for the Project named, and warrant said Work to perform as specified and tated period of time, and ending on 20 to failure to perform due to abuse or neglect by the Owner, or the Owner's successor in
Contractor (the entity holding direct contract with Owner)	Firm
	Representative*
	Signed
	Title
	Notary
	Date
Roofing Installer Same as Contractor (if same as Contractor, check box; leave linesblank)	Firm
	Representative*
	Signed
	Title
	Notary
	Date
Roofing System Manufacturer (if neither Contractor nor Installer)	Firm
	Representative*
	Signed
	Title
	Notary
	Date

^{*}The Firm's Representative affirms they are authorized to bind the Firm to this Warranty. END OF WARRANTY FORM

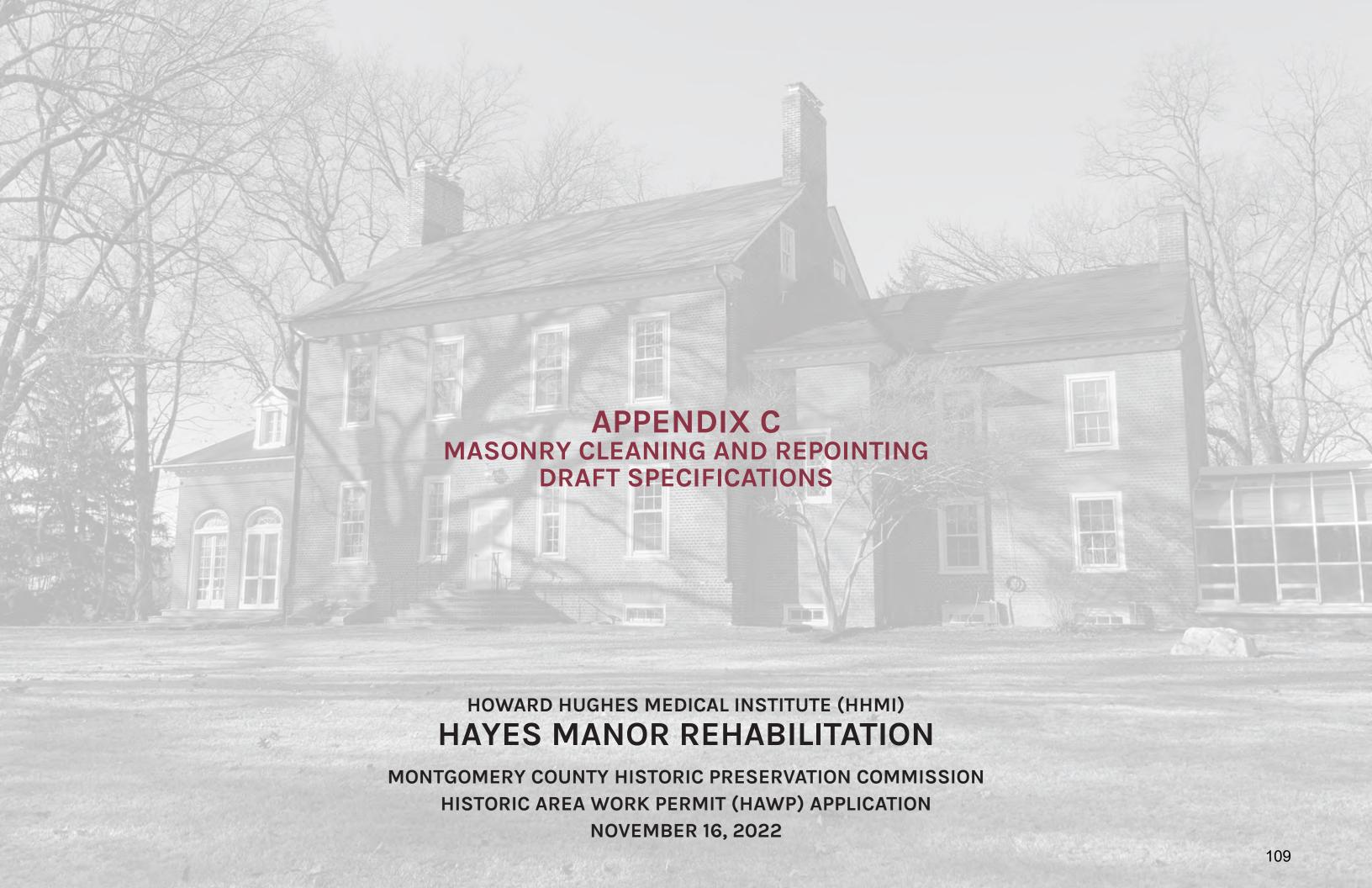
HOWARD HUGHES MEDICAL INSTITUTE
HAYES MANOR REHABILITATION
ISSUED FOR CONSTRUCTION DOCUMENTS
18 NOVEMBER 2022

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SMITHGROUP: #13808

SHEET METAL ROOFING 076100 - 12

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SECTION 04 01 10 - MASONRY CLEANING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.02 <u>DESCRIPTION</u>

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of masonry cleaning as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:
 - 1. Cleaning general soiling from brick masonry using chemical cleaners and pressurized water rinsing.
 - 2. Cleaning biological growth from brick masonry using biocide and pressurized water rinsing.
 - 3. Removing efflorescence from brick masonry using pressurized water rinsing.
 - 4. Removing efflorescence from brick masonry using poultice or chemical cleaners and pressurized water rinsing.
 - 5. Removing paint from brick masonry using chemical strippers and pressurized water rinsing.
 - 5. Protecting window openings, door openings, and other openings in building exterior from water entry before beginning masonry cleaning.

B. Related Work Specified Elsewhere

- 1. Restoration Mortars Section 04 05 13.10
- Masonry Pointing Section 04 05 13.91

1.03 QUALITY ASSURANCE

A. Masonry Cleaning Specialist: Award masonry cleaning work to a firm regularly engaged in cleaning masonry on historic buildings that can demonstrate to Owner's satisfaction that, within previous ten years, the firm has successfully completed at least five projects similar in scope and type to work required on this Project involving buildings designated as Landmarks by local governmental authorities, buildings listed in the National Register of Historic Places, or buildings listed in a State Register of Historic Places under the direction of preservation authorities.

- Foreman: Masonry cleaning shall be directly supervised by a full-time foreman with experience equal to or greater than that required of Masonry Cleaning Specialist. Same foreman shall remain on Project throughout work unless Owner deems foreman's performance unacceptable.
- 2. Mechanics: Masonry cleaning shall be carried out by a steady crew of skilled mechanics who are thoroughly experienced with materials and methods specified and have a minimum of three years' experience cleaning masonry on historic buildings similar to the work required by this Section. In acceptance or rejection of work of this Section, no allowance will be made for workers' inattention or lack of skill.
- B. <u>Laws, Codes, and Regulations</u>: Work of this Section shall comply with applicable federal, state, and local laws, codes, and regulations.
- C. <u>Referenced Standards</u>: Comply with applicable requirements and recommendations of the latest editions of the referenced standards listed herein, except as modified by more stringent requirements of the Contract Documents and of applicable laws, codes, and regulations. In each case in which there is conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.
 - 1. <u>American Institute for Conservation of Historic & Artistic Works (AIC)</u>, Code of Ethics and Guidelines for Practice.
 - 2. <u>United States Secretary of the Interior</u>, Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.
- D. <u>Alternate Masonry Cleaning Methods</u>: If Contractor proposes use of cleaning procedures and products other than those specified and Architect gives preliminary approval following required submittals, Contractor shall perform tests and create mock-ups demonstrating ability of proposed products and procedures to produce specified cleaning results and for comparison with specified mock-ups at no additional cost. No alternate method shall be permitted until Architect has approved it.
- E. <u>Daily Log</u>: Contractor shall keep onsite and available for inspection a daily log describing masonry cleaning operations. Log shall record temperature at beginning and ending of work, weather conditions, whether masonry was wet or dry prior to beginning work, personnel on site, areas cleaned and procedures used, areas inspected and accepted, and other relevant information.
- F. Access for Observation and Approvals: Provide Architect access on a continuing basis to locations on which mock-ups are being carried out, on which work is ongoing, and where work has been completed to allow for observation and approvals. Provide pipe scaffolding and manpower to move and reconfigure scaffolding and planking, personnel lift and manpower to operate lift, or other means of access complying with laws and regulations regarding safety and acceptable to Architect. Provide manpower and equipment to facilitate observation and approvals.

- 1. Extent of Access: Provide Architect with hands-on access to areas in which testing and mock-ups are being conducted and to each and every area of masonry surface that has been cleaned. No approval of masonry cleaning will be given before Architect is provided hands-on access to all surfaces that have been cleaned. Provide access for reinspection of all areas where masonry cleaning work was not approved on first or subsequent inspections until Architect approves work.
- 2. Relocation of Means of Access: If Contractor moves scaffolding, lift, or other means of access before providing Architect with hands-on access to each and every surface of masonry that has been cleaned and to each and every masonry surface that has been cleaned after previous cleaning work was rejected, Contractor shall coordinate reinstallation of means of access to provide for close-up inspection by Architect at no additional cost to Owner.
- G. <u>Building Elevations Showing Masonry Cleaning Progress</u>: On large-scale mounted elevations of the building indicate daily the following: areas currently being cleaned, areas previously cleaned but not yet accepted by Architect, and areas cleaned and accepted by Architect. Indicate required information using visual means acceptable to Architect.
- H. <u>Measurements of Existing Conditions</u>: Measure and record conditions at Project site to allow assessment of conditions during masonry cleaning work.
 - Temperature Measurement: Measure temperature before beginning and during progress of work of this Section as required to ensure compliance with all specified conditions and manufacturer's recommendations for masonry cleaning.
 - 2. <u>pH Measurement</u>: Measure pH of masonry surfaces following chemical cleaning using non-staining litmus paper or litmus strips with appropriate range to ensure that each surface has been properly neutralized.
- I. <u>Prohibited Materials and Methods</u>: The following methods are strictly prohibited and shall not be used for work of this Contract: sandblasting, steam, and use of nonproprietary acids, alkalis, and other products not formulated specifically as products for masonry cleaning.
- J. Knowledge of Site and Project Conditions: Before submitting bid, Bidders shall make themselves thoroughly familiar with the Drawings and Specifications, with the scope of this Project, and with conditions at the Project site relating to requirements of this Section and limitations under which the work will be performed and shall determine or verify dimensions and quantities. Submission of a bid shall be considered conclusive evidence that Contractor is thoroughly familiar with Project requirements and site conditions and limitations.

1.04 SUBMITTALS

A. <u>General</u>: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Architect's approval.

- B. Qualification Data: Qualification data for firm and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least five completed projects similar in size, scope, and character to the work required on this Project. For each project list project name, address, architect, conservator, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. Work Description: Prior to any masonry cleaning work on site, submit detailed description of proposed materials and procedures for each substrate and condition requiring masonry cleaning. Submit new written descriptive information. Photocopies of Contract Documents, excerpts from Contract Documents, and/or duplication of text in Contract Documents will not be accepted for Work Description. Do not begin work on site until work description has been approved in writing. Description for each condition shall include, but not be limited to:
 - 1. <u>Cleaning</u>: Materials, methods, tools, and equipment for each type of masonry cleaning specified herein.
 - 2. <u>Protection</u>: Description, including drawings, of proposed materials and methods of protection for preventing harm, damage, and deterioration caused by work of this Section to persons (whether involved in the Work or not); building elements, materials, and finishes; surrounding plants, landscape, and site; and the environment (including air and water).
 - 3. <u>Alternate Masonry Cleaning Methods and Materials (If Any)</u>: Contractor proposed alternate methods and materials (if any) to those specified for any phase of masonry cleaning. Provide evidence of successful use on comparable projects and demonstrate effectiveness for use on this Project.
- D. <u>Product Data</u>: Submit manufacturer's published technical data for each product to be used in work of this Section including material description, chemical composition (ingredients and proportions), physical properties, recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Safety Data Sheets (SDS).
- E. <u>Schedule of Masonry Cleaning</u>: Prior to commencing masonry cleaning operations, submit a complete detailed schedule for testing and mock-ups and for completion of masonry cleaning.
 - 1. Provide schedule in visual form and in 8-1/2 by 11 inch format or foldout therefrom.
 - 2. After masonry cleaning operations commence, submit updated schedule on a weekly basis.
- F. <u>Waste Disposal Program</u>: Prior to commencing masonry cleaning operations, submit a written description of proposed materials and methods for collection, treatment, and disposal of wastes resulting from masonry cleaning operations.

- G. <u>Daily Log</u>: Submit copy of daily log to Architect each week.
- H. <u>Testing and Mock-Ups</u>: Prepare test panels and mock-ups as described in Articles "Testing" and "Mock-Ups," below.

1.05 TESTING

- A. <u>General</u>: Before beginning mock-ups or general masonry cleaning work, test cleaning and coating removal methods on sample areas to determine most effective product and procedure for cleaning each substrate and for removing each type of coating from each substrate. Do not proceed with mock-ups or general masonry cleaning work until Architect has approved results of testing in writing.
 - 1. Perform tests in locations directed by Architect.
 - 2. Notify Architect 48 hours prior to start of testing.
 - 3. Architect will monitor testing. No testing done in absence of Architect will be accepted.
 - 4. Use crew that will perform the work and follow requirements of this Section.
 - 5. All materials, dilutions, dwell times, and procedures are subject to modification by Architect during testing process. Architect will choose products and procedures to be used for cleaning masonry and for removing soiling and coatings based on results of test panels. Modifications of sequence, chemical dilution, substitute reagents, and equivalent procedures shall be executed at no additional cost.
 - a. Do not apply products to masonry surfaces without verifying dilution with Architect.
 - 6. After test panels are complete, allow seven days for thorough drying and appearance of possible adverse effects prior to final evaluation.
 - 7. Perform additional testing as necessary to determine proper chemicals and procedures, including dilutions and dwell times, to Architect's satisfaction.

B. Provide the Following Test Panels

- Cleaning General Soiling from Brick Masonry Using Chemical Cleaners and Pressurized Water Rinsing: Prepare at least one 1-sq.-ft. test panel for each type of brick masonry. Prepare additional test panels using different procedures as directed.
- 2. Removing Biological Growth from Brick Masonry Using Biocide and Pressurized Water Rinsing: Prepare at least one 1-sq.-ft. test panel on each type of masonry from which biological growth is to be removed using each biocide specified for testing. Provide additional test panels using different products, application methods, dwell times, and removal methods as directed.

- 3. Removing Efflorescence from Brick Masonry Using Poultices or Chemical Cleaners and Pressurized Water Rinsing: Prepare at least one 1-sq.-ft. test panel on each type of masonry from which efflorescence is to be removed using poultice specified for testing. Provide additional test panels using different products, application methods, dwell times, and removal methods as directed.
- 4. Removing Efflorescence from Brick Masonry Using Pressurized Water: Prepare at least one 1-sq.-ft. test panel on each type of masonry from which efflorescence is to be removed using pressurized water. Prepare additional test panels using different procedures as directed.
- 5. Removing Paint from Brick Masonry Using Chemical Strippers and Pressurized Water Rinsing: Prepare at least one 1-sq.-ft. test panel on each type of masonry from which paint is to be removed using each chemical stripper specified for testing. Provide additional test panels using different products, application methods, dwell times, and removal methods as directed.

1.06 MOCK-UPS

- A. <u>General</u>: Following completion of testing and before beginning general masonry cleaning work, prepare mock-ups to provide standards for work of this Section. Do not proceed with masonry cleaning until Architect has approved mock-ups.
 - 1. Locate mock-ups as directed by Architect.
 - 2. Notify Architect 48 hours prior to start of each mock-up.
 - Architect will monitor mock-ups. Mock-ups not performed in presence of Architect will be rejected.
 - 4. Use crew that will perform the work and follow requirements of this Section.
 - 5. Repeat mock-ups as necessary to obtain Architect's approval.
 - 6. Allow mock-ups to dry for one week to allow natural color to return and problems to appear. Notify Architect when mock-ups are ready for inspection.
 - 7. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration at time of Substantial Completion.
 - 8. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the Work.
 - 9. Approved mock-ups will represent minimum standards for masonry cleaning. Subsequent masonry cleaning work that does not meet standards of approved mock-ups will be rejected.

B. <u>Prepare the Following Mock-Ups</u>

1. Cleaning General Soiling from Brick Masonry: One location, 16 sq. ft.

- 2. <u>Cleaning Biological Growth from Brick Masonry</u>: One panel 9 sq. ft. or size of biological growth, whichever is less, on each type of masonry from which biological growth is to be removed.
- 3. Removing Efflorescence from Brick Masonry: One panel 9 sq. ft. or size of efflorescence deposit, whichever is less, on each type of masonry from which efflorescence is to be removed.
- 4. Removing Paint from Brick Masonry: One panel 36 sq. ft. for each type of paint on each type of masonry from which paint is to be removed.
- 5. <u>Sealing Window Openings To Prevent Water Entry</u>: One entire window.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in manufacturer's original containers with labels identifying manufacturer, product, ingredients, instructions for use, and safety precautions. Do not deliver products until MSDS sheets for products are available on site.
- B. Deliver, store, and handle products and materials to prevent damage, deterioration, degradation, and intrusion of foreign material.
- C. Discard and remove from site deteriorated materials, contaminated materials, and products that have exceeded their expiration dates. Replace with fresh materials.

1.08 PROJECT CONDITIONS

- A. <u>Safety</u>: Protect persons, whether involved with work of this Section or not, from harm caused by work of this Section.
 - 1. Erect temporary protective covers at doorways to building that must remain in operation during course of masonry cleaning work when work is ongoing around or above doorways.
 - 2. Provide protection to prevent persons, except properly protected masonry cleaning personnel, from coming in contact with masonry cleaning materials and waste from masonry cleaning process.
 - 3. Provide workers all means of protection necessary to prevent harm caused by work of this Section.
- B. <u>Protection of Building</u>: Protect building elements and finishes from damage and from deterioration caused by masonry cleaning work. Repair damage to materials and damage to finishes resulting from work of this Section to Architect's satisfaction at no additional cost to Owner.
 - 1. <u>Adjacent Materials</u>: Protect adjacent materials, including but not limited to masonry, metals, glass, paint, and sealants, from masonry cleaning solutions and abrasives that might adversely affect such materials.
 - 2. <u>Spread of Masonry Cleaning Solutions</u>: Do not clean masonry during winds of sufficient force to spread masonry cleaning solutions to unprotected

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surfaces. Cease masonry-cleaning operations when winds may carry chemicals, rinse water, or run-off from chemical cleaning to unprotected areas.

- 3. Window and Door Openings and Other Penetrations in Building Skin: Prevent masonry cleaning solutions and waste products from entering behind masonry surface at penetrations in skin. Provide reversible temporary seals that will prevent water and chemicals from entering openings and that will not damage or deteriorate substrate. Remove temporary seals following masonry cleaning. Restore substrates to condition before installation of temporary seals.
 - a. <u>Infiltration</u>: If Contractor notices that water or chemicals are penetrating building skin or if Contractor is told that water or chemicals are penetrating building skin, Contractor shall cease masonry cleaning operations immediately. Masonry cleaning operations shall not proceed until cause of infiltration has been eliminated.
- 4. <u>Monitoring for Water Entry</u>: During periods when water, detergents, or chemicals are being applied to the exterior masonry, Contractor shall designate one trained person to examine interior spaces and surfaces for evidence of water infiltration. If water infiltration is detected, masonry cleaning operations shall cease immediately. Masonry cleaning operations shall not proceed until cause of infiltration has been eliminated.
- C. <u>Protection of Surroundings</u>: Protect adjacent buildings, site, landscape features, public rights of way, motor vehicles, and other surrounding elements from damage and from deterioration resulting from masonry cleaning work.
 - Collect and dispose of runoff and residue from masonry cleaning operations by legal means and in manner that prevents soil erosion, undermining of paving and foundations, damage to sidewalks, water penetration into building interiors, and harm to buildings, landscape elements, and natural bodies of water and water table.

D. Coordination

- 1. <u>Staging</u>: Schedule and stage masonry cleaning so that no runoff from masonry cleaning operations comes in contact with previously cleaned masonry.
- E. <u>Preconstruction Meeting</u>: Convene a preconstruction meeting to discuss masonry cleaning and its effect on adjacent elements, materials, and finishes. Attendees shall include Owner's Representatives, Architect, firm(s) that will perform masonry cleaning, and other entities that might be affected by masonry cleaning work.

1.09 ENVIRONMENTAL REQUIREMENTS

A. <u>Use of Water</u>: Do not perform masonry cleaning work that will wet masonry materials or cause them to be wet when ambient temperature is below 40 deg F or when temperature of air or masonry is expected to drop below 40 deg F within 72

hours as predicted for Chevy Chase, Maryland by AccuWeather or the National Weather Service. Do not begin work when any part of wall or any materials are frozen or subject to freezing.

1.10 COLLECTION AND DISPOSAL OF WASTE PRODUCTS

- A. <u>General</u>: Collect, contain, test, and dispose of solid and liquid wastes in accordance with applicable federal, state, and local laws and regulations.
- B. <u>Collection</u>: Provide gutters and troughs to collect runoff from masonry cleaning operations for pretreatment prior to disposal. Do not allow waste materials from masonry cleaning operations to flow or drop onto adjacent roofs; setbacks; sidewalks; trees, shrubs, plants, grass, and other plantings; soil; or structures. Direct waste materials to collection vessels for treatment.
- C. <u>Neutralizing</u>: Neutralize masonry cleaning waste products to a pH of between 5.0 and 9.5. Propose specific methods and materials for neutralization in Waste Disposal Program submission.
- D. <u>Disposal</u>: Dispose of masonry cleaning run-off by legal means that prevent: erosion, undermining, damage to plant material, and water penetration into building.
 - 1. Install protection and waste collection systems before beginning masonry cleaning work.
 - Test drains and other water removal systems to ensure that they are functioning properly before masonry cleaning operations begin. Notify Architect at once if drains or systems are stopped or blocked. Do not begin work of this Section until drains are in good working order.
 - Filter masonry cleaning runoff to prevent suspended solids such as masonry residue from entering drains and drain lines. Clean out drains and drain lines that become blocked or filled with sand or other solids as a result of masonry cleaning work at no additional cost to Owner.
 - 4. Dispose of waste products at frequent, regular intervals. Do not allow waste products to accumulate on site.

1.11 POSSIBLE HARMFUL EFFECTS OF BIRD MATTER

- A. During work of this Section, bird droppings and other bird related matter may be encountered. This matter may contain substances, including agents of diseases such as Histoplasmosis and Cryptococcosis, that are harmful, and occasionally fatal, to humans.
- B. Prevent people other than properly protected workers from coming in contact with such matter.
- C. Prevent workers without appropriate protection from touching, ingesting, inhaling, or contacting in any other way bird droppings and other bird related matter.

D. Handle and dispose of bird related matter in compliance with applicable federal, state, and local laws and regulations and in a manner that does not threaten health and welfare of public and workers.

PART 2 – PRODUCTS

2.01 MANUFACTURERS AND SUPPLIERS

- A. General: Provide products by the following manufacturers or approved equals.
- B. Cathedral Stone Products, Inc., 7266 Park Circle Drive, Hanover, MD 21076 (800-684-0901).
- C. D/2 Biological Solutions, Inc., PO Box 3746, Westport, MA (917-693-7441)
- D. Dumond Chemicals, Inc., 104 Interchange Plaza, Suite 202, Monroe Township, NJ 08831 (800-245-1191).
- E. ProSoCo, Inc., 3741 Greenway Circle, Lawrence, KS 66046 (800-255-4255).
- F. Sunnyside Corporation, 225 Carpenter Avenue, Wheeling, IL 60090 (800-323-8611).
- G. Sunshine Makers, Inc., 15922 Pacific Coast Highway, Huntington Beach, CA 92649 (562-795-6000).

2.02 CLEANING MATERIALS FOR WATER AND CHEMICAL CLEANING

- A. <u>General</u>: Provide the following products for use in testing for cleaning substrates and conditions indicated. Test using dilutions as specified by Architect. Provide products selected during testing for use in mock-ups and for use in cleaning building and at dilutions as selected and approved by Architect in each case at no additional cost to Owner.
- B. <u>Cleaners for Testing for Removing General Soiling from Brick Masonry</u>. Test each of the following or approved equal:
 - 1. Enviro Klean 2010 All Surface Cleaner, manufactured by ProSoCo, Inc.
 - 2. Sure Klean Light Duty Restoration Cleaner, manufactured by ProSoCo, Inc.
 - 5. Light Duty Cleaner, manufactured by Cathedral Stone Products.
- C. <u>Cleaners for Testing for Removing Biological Growth from Brick Masonry</u>. Test each of the following or approved equal:
 - 1. Enviro Klean ReVive, manufactured by ProSoCo., Inc.
 - 2. D/2 Biological Solution, available from Limeworks.US.
 - 2. Bio-Cleaner, manufactured by Cathedral Stone Products.

- D. <u>Cleaners for Testing for Removing Efflorescence from Brick Masonry</u>. Test each of the following or approved equal:
 - 1. Efflorescence Remover, manufactured by Cathedral Stone Products.
 - 2. Sure Klean 1260 Limestone & Marble Poultice, manufactured by ProSoCo., Inc.
 - 3. Attapulgite Clay, available from Superior Materials, Inc., mixed with distilled water.
- E. <u>Strippers for Testing for Removing Paint from Masonry Substrates</u>: Test each of the following, or approved equal:
 - 1. Back to Nature MultiStrip, manufactured by Sunnyside Corporation.
 - 2. Back to Nature Ready-Strip Pro, manufactured by Sunnyside Corporation.
 - 3. Light Duty Paint Remover, manufactured by Cathedral Stone Products.
 - 4. SmartStrip Pro, manufactured by Dumond Chemicals, Inc.
- F. Water for Chemical Cleaning, Low Pressure Water Cleaning, Pressure Rinsing, and Other Work of this Section: Clean, potable, free of oils, acids, alkalis, salts, organic matter, soluble and insoluble iron, and other substances detrimental to surfaces being cleaned and non-staining.
 - 1. <u>Source</u>: Subject to requirements specified, water may be obtained from city water supply.
 - 2. <u>Distribution</u>: Pump water to locations where work of this Section is being performed at pressure and flow rate required for optimum cleaning using each process.

2.03 EQUIPMENT FOR WATER RINSING

- A. <u>General</u>: Provide all equipment and accessories to distribute water at pressures and flow rates required for masonry cleaning.
- B. Pressure Pumps: Pressure pumps capable of producing water flow at a rate of 6 gallons per minute at a pressure of 800 psi at nozzle on end of hose. Pumps, or a combination of pumps plus pressure reducing valves, shall have capability of providing water at a steady pressure and flow rate at all pressures from 100 psi to 800 psi. Pumps shall have working pressure gauges. Pumps found to be without working pressure gauges shall be removed from site, and work shall cease until pumps have been replaced with pumps having working pressure gauges. Pumps shall have no ferrous elements in contact with liquid stream.
- C. <u>Particulate Filter</u>: Provide a 5-micron particulate filter in line with water supply. All water used for masonry cleaning shall be filtered.
 - 1. Replace particulate filter as required to provide filtered water with no particles

greater than 5 microns at pressure and flow rate specified.

- D. <u>In-line Pressure Gauges</u>: Each water line used for pressure rinsing shall have a working pressure gauge within 15 feet of nozzle used for rinsing.
- E. <u>Spray Nozzles for Pressure Rinsing</u>: Nozzles shall be of nonferrous metal and shall have a minimum 15-degree fan tip.

2.07 MISCELLANEOUS MATERIALS

- A. <u>Sealant</u>: Manufacturer's standard one part acrylic latex sealant. Use exclusively for temporary sealing of cracks and joints around penetrations during masonry cleaning work.
 - 1. Do not use sealant containing silicone or other elastomeric product.
- B. <u>Backer Rod</u>: Closed cell expanded polyethylene rod, sized 25 percent greater than joint to be sealed.
- C. <u>Protection Materials</u>: Provide materials recommended by cleaner manufacturers for products to be used that will protect from damage caused by chemicals without causing damage to materials to be protected.
 - 1. Glass and Metal Protection: "Strippable Acid Stop" manufactured by ProSoCo, Inc., or approved equal.
 - 2. <u>Plastic Sheeting</u>: Polyethylene sheeting, 6 mils thick minimum.
- D. <u>Brushes</u>: Natural fiber bristle or synthetic fiber bristle only. No metal bristle brushes are permitted.
- E. <u>pH Indicator</u>: Non-staining litmus paper or strips with appropriate range approved by Architect. Furnish pH strips on site during all work of this Section.

2.08 MIXING CHEMICAL CLEANING SOLUTIONS

- A. <u>General</u>: Dilute chemical cleaning materials as determined following results obtained through test panels. Manufacturer's recommended dilutions may be modified to reflect results of test panels and approved mock-ups.
 - 1. Supply all dilutions of chemical cleaners at no additional cost.
- B. Create test panels using a minimum of two dilutions for each product where dilution is recommended by manufacturer or requested by Architect.

PART 3 - EXECUTION

3.01 GENERAL MASONRY CLEANING REQUIREMENTS

A. <u>General</u>: These requirements apply to all work of this Section.

- B. <u>Masonry Cleaning Progress</u>: Clean masonry systematically in full-height, top-to-bottom sections of areas to be cleaned.
 - Masonry Cleaning: Begin masonry cleaning using water at top of section to be cleaned and proceed to bottom of section before moving to adjacent section, except for remover of paint strippers where manufacturer specifically requires that removal begin at bottom of area coated with stripper.
- D. <u>Timing</u>: Control timing of masonry cleaning operations (including dwell times of cleaners) to ensure that specified times are maintained. Do not allow chemicals to remain on surfaces longer than dwell times determined during testing and confirmed during mock-ups.
- E. <u>Water Pressure and Flow Rate</u>: Limit water pressure and flow rates to maximum pressures specified herein and to lower pressures as required to avoid damaging masonry, metals, sealants, and other materials and finishes.
 - 1. <u>Pressure</u>: 500 psi or less as required to avoid damage to materials being cleaned.
 - 2. Flow Rate: 6 gallons per minute.
 - 3. <u>Nozzle Position</u>: Hold nozzle at a uniform distance from and angle to masonry surface as determined by testing and confirmed by mock-ups to provide optimum cleaning without damaging masonry surface. Nozzle shall be at least 12 inches from masonry surface.
 - 4. <u>Adjustments</u>: If any building material is damaged or deteriorated by water rinsing, immediately cease work. Do not resume pressure rinsing until water pressure and flow rate have been adjusted to avoid damage to building materials.
- F. <u>Uniform Cleaning</u>: Clean masonry to achieve even, uniform surfaces so that edges, corners, crevices, profiles, and recessed areas are cleaned to the same extent as flat surfaces.
- G. <u>Adjustment and Alteration</u>: Masonry cleaning procedures, including cleaning chemical, chemical dilution, dwell time, and application and removal procedures may be adjusted and/or altered by Architect based on site conditions.
- H. <u>Completion of Masonry Cleaning</u>: Cleaned masonry shall match approved mockups. Areas are subject to additional cleaning as directed by Architect in order to match mock-ups. Work of masonry cleaning on each surface shall not be considered complete until Architect has inspected surface and so notified Contractor in writing.

3.02 TESTING

A. <u>General</u>: Perform testing under direction of Architect following requirements of Article "Testing," above, to determine most appropriate products and procedures for cleaning each substrate before preparing mock-ups or beginning general

masonry cleaning work.

3.03 MOCK-UPS

A. <u>General</u>: Provide mock-ups under direction of Architect following requirements of "Mock-Ups" Article, above, to confirm products and procedures selected during testing and to provide standards for evaluation of the masonry cleaning work.

3.04 <u>CLEANING GENERAL SOILING FROM BRICK MASONRY USING CHEMICAL</u> REMOVER AND PRESSURIZED WATER RINSING

- A. <u>General</u>: Clean masonry free of soiling using cleaning chemical selected during testing followed by pressurized water rinsing. Cleaned masonry shall match approved mock-up to Architect's satisfaction.
- B. <u>Cleaner Application and Removal</u>: Apply and remove cleaner following method of application and dwell times determined during testing and confirmed during mockups. Scrub surface gently with fiber bristle brushes. Rinse surface thoroughly using water at a pressure of 500 psi and flow rate of 6 gpm.
- C. <u>Additional Cleaning</u>: Repeat above procedure as necessary to achieve uniformly clean masonry surface matching standard of approved mock-up.

3.05 <u>CLEANING BIOLOGICAL GROWTH FROM BRICK MASONRY USING BIOCIDE</u> <u>AND WATER RINSING</u>

- A. <u>General</u>: Clean masonry free of biological growth using biocide selected during testing followed by pressurized water rinsing. Cleaned masonry shall match approved mock-up to Architect's satisfaction.
- B. <u>Biocide Application and Removal</u>: Apply biocide following method of application and dwell time determined during testing and confirmed during mock-ups. Scrub surface with fiber-bristle brushes. Rinse surface thoroughly using water at a pressure of 500 psi and flow rate of 6 gpm.
- C. <u>Additional Cleaning</u>: Repeat above procedure as necessary to achieve uniformly clean masonry free of biological growth matching standard of approved mock-up.

3.06 REMOVING EFFLORESCENCE FROM BRICK MASONRY USING PRESSURIZED WATER RINSING

- A. <u>General</u>: Clean masonry free of general soiling using pressurized water rinsing to match approved mock-up.
- C. <u>Rinsing</u>: Carefully rinse masonry surface using water at a pressure of 500 psi and flow rate of 6 gpm. Hold nozzle at a consistent distance from and angle to masonry surfaces as determined during testing. Overlap passes slightly to ensure surfaces are thoroughly and uniformly rinsed. Rinse surfaces at least twice, first with vertical passes and then with horizontal passes to ensure complete coverage.
- D. Additional Cleaning: Repeat above procedure as necessary to achieve uniformly

clean masonry surface matching standard of approved mock-up.

3.07 REMOVING EFFLORESCENCE FROM BRICK MASONRY USING POULTICES OR CHEMICAL CLEANERS AND WATER RINSING

- A. <u>General</u>: Remove efflorescence from masonry using poultice selected during testing and confirmed during mock-up to achieve masonry surface free of efflorescence matching approved mock-up to Architect's satisfaction.
- B. <u>Poultice Application and Removal</u>: Prepare poultice as determined during testing. Apply poultice following method of application and dwell time determined during testing and confirmed during mock-ups. Remove poultice and efflorescence by brushing with natural or synthetic fiber bristle brushes. Rinse surface thoroughly using low-pressure water.
- B. <u>Cleaner Application and Removal</u>: Apply and remove cleaner following method of application and dwell times determined during testing and confirmed during mockups. Scrub surface gently with fiber bristle brushes. Rinse surface thoroughly using water at a pressure of 500 psi and flow rate of 6 gpm.
- C. <u>Additional Removal</u>: Repeat above procedure as necessary to achieve uniformly clean masonry free of efflorescence with surface matching standard of approved mock-up.

3.08 REMOVING PAINT FROM BRICK MASONRY USING CHEMICAL STRIPPERS AND PRESSURIZED WATER RINSING

- A. <u>General</u>: Remove paint from masonry using strippers and form of stripper (liquid, gel, and/or poultice) selected during testing and confirmed during mock-up to achieve masonry surface free of paint matching approved mock-up to Architect's satisfaction.
- B. <u>Stripper Application and Removal</u>: Apply stripper following method of application and dwell time determined during testing and confirmed during mock-ups. Remove stripper and paint following manufacturer's directions. Rinse surface thoroughly using water at a pressure of 500 psi and flow rate of 6 gpm, overlapping passes slightly.
- C. <u>Additional Removal</u>: Repeat above procedure as necessary to achieve uniformly clean masonry free of paint with surface matching standard of approved mock-up.

3.09 ADJUSTMENT AND PROTECTION

- A. Reclean masonry surfaces that do not have an even, uniform clean appearance matching approved mock-ups to achieve uniformly clean surfaces matching approved mock-ups.
- B. Protect cleaned surfaces from dirt and soiling from other than normal atmospheric pollution until Project completion. Reclean surfaces that become dirty or soiled to Architect's satisfaction at no additional cost to Owner.

SECTION 04 05 13.10 - RESTORATION MORTARS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.02 DESCRIPTION

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of restoration mortars as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:
 - 1. Mortars for pointing brick masonry.

B. Related Work Specified Elsewhere

- 1. Masonry Cleaning Section 04 01 10
- 2. Masonry Pointing Section 04 05 13.91

1.03 QUALITY ASSURANCE

- A. <u>Masonry Restoration Specialist</u>: Award restoration mortars work to a firm regularly engaged in preparation of mortars to match historic mortars and repair mortars matching historic masonry units that can demonstrate to Owner's satisfaction that, within previous five years, it has successfully performed and completed in a timely manner at least three projects similar in scope and type to work required on this Project involving buildings designated as Landmarks by local governmental authorities, buildings listed in the National Register of Historic Places, or buildings listed in a State Register of Historic Places under the direction of preservation authorities.
 - 1. <u>Foreman</u>: Mortar preparation shall be directly supervised by a full-time foreman with experience equal to or greater than that required of Masonry Restoration Specialist. Same foreman shall remain on Project throughout work unless Owner deems foreman's performance unacceptable.
 - Mechanics: Mortars shall be prepared by a steady crew of skilled masons
 who are thoroughly experienced with materials and methods specified and
 have a minimum of three years' experience with work on historic buildings
 similar to that required by this Section. In acceptance or rejection of work of
 this Section, no allowance will be made for workers' inattention or lack of
 skill.
- B. <u>Laws, Codes, and Regulations</u>: Work of this Section shall comply with applicable

federal, state, and local laws, codes, and regulations.

C. Referenced Standards: Work of this Section shall comply with applicable requirements and recommendations of latest editions of the documents listed herein, except as modified by more stringent requirements of the Contract Documents and of applicable laws, codes, and regulations of authorities having jurisdiction. In each case in which there is a conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.

1. <u>ASTM International (ASTM)</u>

- a. ASTM C 141, Standard Specification for Hydraulic Hydrated Lime for Structural Purposes.
- b. ASTM C 144, Standard Specification for Aggregate for Masonry Mortar.
- c. ASTM C 270, Standard Specification for Mortar for Unit Masonry.
- d. ASTM C 979, Standard Specification for Pigments for Integrally Colored Concrete.
- e. ASTM C 1324, Standard Test Method for Examination and Analysis of Hardened Masonry Mortar.
- f. ASTM C 1713, Standard Specification for Mortars for the Repair of Historic Masonry.
- D. <u>Sources of Materials</u>: Obtain each type of material required for restoration mortars from a single source to ensure a match in quality, performance, and appearance.
- E. Knowledge of Site and Project Conditions: Before submitting bid, Bidders shall make themselves thoroughly familiar with the Drawings and Specifications, with the scope of this Project, and with conditions at the Project site relating to requirements of this Section and limitations under which the work will be performed and shall determine or verify dimensions and quantities. Submission of a bid shall be considered conclusive evidence that Contractor is thoroughly familiar with Project requirements and site conditions and limitations.

1.04 SUBMITTALS

- A. <u>General</u>: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Architect's approval.
- B. <u>Qualification Data</u>: Qualification data for firm and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least three completed projects similar in size and scope to the work required on this Project. For each project list project name,

- address, architect, conservator, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. <u>Product Data</u>: Manufacturer's published technical data for each product to be used in work of this Section including material description, chemical composition (ingredients and proportions), physical properties, recommendations for application and use, test reports and certificates verifying that product complies with specified requirements, and Safety Data Sheets (SDS).
- D. <u>Work Description</u>: Detailed description of proposed methods and procedures for proportioning and mixing mortars to ensure consistent products. Do not begin work on site until Architect has approved Work Description in writing. Description shall include, but shall not be limited to:
 - 1. <u>Environmental Conditions</u>: Proposed procedures for ensuring uniform conditions for proportioning and mixing mortars in factory or shop.
 - 2. Quality Control Procedures: Proposed procedures to ensure that mortar mixes for each use are consistent throughout the length of the Project. Include proposed procedures for ensuring that each type and formulation of mortar is used in specified locations and only in those locations.
 - 3. <u>Types of Packaging</u>: Proposed packaging for delivery of mortar mixes.
 - 4. <u>Storage</u>: Proposed locations and conditions for storage of delivered mortar mixes prior to use to avoid contamination and deterioration.
 - 5. <u>Testing Procedures</u>: Proposed procedures for testing mortars to ensure compliance with requirements.

E. Samples

- 1. Brick Masonry <u>Pointing Mortar</u>: Cured mortar samples set in 1/2-inch by 6-inch plastic or aluminum channels for approval of color and texture. Samples shall match existing mortar.
- Sand for Pointing Mortars: Five-pound sample of each type of sand proposed for use in pointing mortars. Include sieve analysis (ASTM C 144) for each type of sand.

1.05 <u>DELIVERY, STORAGE, AND HANDLING</u>

- A. Deliver materials in manufacturer's original containers and packaging clearly labeled with manufacturer's name, address, and product identification.
- B. Deliver, store, and handle products and materials to prevent damage, deterioration, degradation, and intrusion of foreign material. Store cementitious materials above ground and under cover to prevent materials from drawing damp.
- C. Discard and remove from site deteriorated materials, contaminated materials, and

products that have exceeded their expiration dates. Replace with fresh materials.

1.06 PROJECT CONDITIONS

- A. <u>Safety</u>: Protect all persons, whether or not involved in work of this Section, from harm caused by or resulting from work of this Section.
 - 1. <u>Protection from Hazardous Materials</u>: Protect workers and other persons from contact with hazardous materials resulting from work of this Section.
 - a. <u>Silica</u>: Use procedures necessary to protect workers and other persons from exposure to respirable crystalline silica. All work should be performed in compliance with applicable OSHA regulations, including but not limited to "Respirable Crystalline Silica Standard" (Title 29, Code of Federal Regulations (CFR) Section 1926.1153) and with other applicable state and local laws and regulations.
- B. <u>Protection of Building</u>: Protect building elements and finishes from damage and from deterioration caused by work of this Section. Repair materials and finishes damaged as a result of work of this Section to Architect's satisfaction at no additional cost to Owner.
- C. <u>Preconstruction Meeting</u>: Convene a preconstruction meeting to discuss restoration mortars work and its effect on adjacent elements, materials, and finishes. Attendees shall include Owner's Representatives, Architect, Construction Manager, firm(s) that will perform restoration mortars work, and other entities that might be affected by restoration mortars work.

1.07 <u>ENVIRONMENTAL CONDITIONS</u>

- A. <u>General</u>: Perform work only when temperature of products being used and air temperature and humidity comply with manufacturer's requirements and requirements of this Section. In case of conflict, the most stringent requirements shall govern.
- B. <u>Cold Weather Limitations on Use of Mortars</u>: Do not mix or use mortars when air or masonry temperature is below 40 deg F or when it is forecast to drop below 40 deg F within 72 hours of mortar application unless Architect has approved both Contractor's work proposal for cold- and hot-weather masonry work and also specific masonry work to be done in each instance.
 - Masonry work in temperatures below 40 deg F shall comply with requirements of this Section; with requirements of Section 04 05 13.91 – "Masonry Pointing"; with requirements of sections in which mortar is used to set, point, and repair masonry; and with work proposal specifically approved by Architect.
 - Remove masonry work determined by Architect to have been damaged by freezing conditions and replace following requirements of this Section at no additional cost to Owner.
- C. Hot Weather Requirements: Do not mix or use mortars when temperature is above

100 deg F or when temperature is above 90 deg F and wind is above 8 mph, or when either of these conditions is forecast to occur within 72 hours of mortar application unless Architect has approved both Contractor's work proposal for cold- and hot-weather masonry work and also specific masonry work to be done in each instance.

- 1. Masonry work when temperature is above 100 deg F or when temperature is above 90 deg F and wind is above 8 mph, or when either of these conditions is forecast to occur within 72 hours of mortar application shall comply with requirements of this Section; with requirements of Section 04 05 13.91 "Masonry Pointing"; with requirements of sections in which mortar is used to set, point, and repair masonry; and with work proposal specifically approved by Architect.
- Remove masonry work determined by Architect to have been damaged by hot weather conditions and replace following requirements of this Section at no additional cost to Owner.

PART 2 – PRODUCTS

2.01 MORTAR MATERIALS, GENERAL

- A. <u>Grade and Quality</u>: Materials shall conform to requirements of this Section and shall be new, free from defects, and of recent manufacture.
- B. <u>Manufacturer's Instructions</u>: Comply with material manufacturer's instructions for use of products (including surface preparation, mixing, applying, drying, etc.). In case of conflict with requirements of this Section, the more stringent requirements shall govern.
- C. Prohibited Materials: The following materials are strictly prohibited in mortars:
 - 1. Masonry cements, masonry mortars, and other components that include ingredients other than Portland cement, lime, and approved aggregates.
 - 2. Additives and admixtures other than those specified and approved in writing by Architect.

2.02 MORTAR INGREDIENTS

A. Natural Hydraulic Lime: Pure, natural hydraulic lime complying with ASTM C 141, containing no additives (including, but not limited to, pozzolans, gypsum, air entraining agents, ash, or cement), with an SO₃ content not exceeding 0.54 percent, and with a free lime content above 15 percent. Provide NHL-2 (Feebly Hydraulic Natural Hydraulic Lime) NHL-3.5 (Moderately Hydraulic Natural Hydraulic Lime) to comply with requirements of BS EN 459-1. Subject to compliance with requirements, provide St. Astier NHL-5 Natural Hydraulic Lime, NHL-3.5 Natural Hydraulic Lime, and NHL-2 Natural Hydraulic Lime, available from LimeWorks.US, P.O. Box 151, Milford Square, PA 18935 (215-536-6706) or approved equal.

- B. Sand: Clean sharp sand, free of loam, silt, soluble salts, organic matter, and other substances that might adversely affect mortar, masonry units, or embedded elements and graded in compliance with ASTM C 144. Where mortar is to match existing original mortar, select sand or other aggregate to provide mortar matching color and texture of original mortar (with minimum addition of pigment). Sieve and mix sand and aggregates from individual sources and from more than one source to provide mortar matching original mortar.
- C. <u>Pigments</u>: Natural and/or synthetic, milled, blended mineral oxide pigments in dry powder form complying with ASTM C 979 and shown through previous use and exposure to produce uniform and consistent color and to be permanent, inert, stable to atmospheric conditions, sunfast, weather resistant, alkali resistant, water insoluble, lime proof, nonbleeding and free of fillers, extenders, and admixtures. Provide pigments as required to provide color of mortar to match original mortar as approved by Architect. Provide one of the following or approved equal:
 - 1. SGS Concentrated Mortar Colors by Solomon Colors, Inc., 4050 Color Plant Road, Springfield, IL 62702 (800-624-0261).
 - Lanxess Bayferrox Iron Oxide Pigments by Lanxess Corporation, Business Unit Inorganic Pigments, 111 RIDC Park West Drive, Pittsburgh, PA 15275 (412-809-1000).
 - 3. Davis Colors by Davis Colors, 3700 East Olympic Blvd., Los Angeles, CA 90023 (800-356-4848).
- D. <u>Water</u>: Clean and free of substances that might adversely affect mortar, masonry, and embedded elements.

2.03 MORTAR MIXES

A. General

- 1. Mortars specified hereinafter shall comply with ASTM C 1713, Standard Specification for Mortars for the Repair of Historic Masonry.
- 2. Mix mortars using proportions specified herein as adjusted, if necessary, by the amount of moisture in the ingredients. The proportions specified are for dry cements and limes and damp, loose (saturated, surface-dry) sand. If ingredients with different moisture contents are used (for example, lime putty is used in place of lime or dry sand is used in place of damp, loose sand), adjust quantities so that the proportions of ingredients in the mixes equal the proportions specified as approved by Architect.
- B. <u>Mortar for Pointing Joints in Brick Masonry</u>: Provide the following mortars. Mortar mixes may change and may require adjustment before and during construction in accordance with preconstruction conformance testing, field-testing, and Architect's evaluation thereof.
 - 1. <u>Natural Hydraulic Lime Mortar</u>: Proportion mortar by volume as follows to achieve a mortar with a minimum compressive strength of 160 psi at 28

days.

- a. 1 part by volume natural hydraulic lime, NHL-3.5
- b. 2-1/2 parts by volume sand (selected to match sand in original mortar of masonry being pointed)
- c. Oxide pigments as required to produce mortar matching color of original mortar in masonry being pointed but not to exceed 7 percent of the weight of the natural hydraulic lime.

2.04 MIXING OF MORTARS

- A. <u>Measuring</u>: Measure mortar ingredients carefully using containers with fixed volumes so that proportions are controlled and maintained throughout the course of the work of this Section.
- B. <u>Mixing Lime Mortars</u>: Mix lime mortars using a helical paddle mixer, a pan mixer (in which the mortar is mixed by rotating paddles) or a traditional roller mixer as approved by lime supplier and Architect.
- C. <u>Water</u>: Use minimum amount of water to produce a workable consistency for mortar's intended purpose.
 - 1. <u>Mortar for Pointing</u>: As dry a consistency as will produce a mortar sufficiently plastic to be worked into joints.
- D. <u>Small Batches</u>: Where mortar is required in small batches of less than one cubic yard and Architect specifically approves, mortar may be mixed by hand in clean wooden or metal boxes prepared for that purpose provided that Architect approves mixing boxes and methods of mixing and transferring Portland cement and lime mortars.
- E. After mixing, mortars for pointing or setting shall sit for 20 minutes prior to use to allow for initial shrinkage. Mortar shall be placed in final position within two hours of mixing. Retempering of partially hardened material is not permitted.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install mortars as part of the work of the following Sections.
 - Masonry Pointing Section 04 05 13.91

END OF SECTION 04 05 13.10

SECTION 04 05 13.91 - MASONRY POINTING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.02 <u>DESCRIPTION</u>

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the work of masonry pointing as shown on the Drawings, as specified herein, and as may be required by conditions and authorities having jurisdiction, including, but not limited to, the following:
 - 1. Preparing and pointing joints in brick masonry.

B. Related Work Specified Elsewhere

- 1. Restoration Mortars Section 04 05 13.10
- 2. Masonry Cleaning Section 04 01 10

1.03 QUALITY ASSURANCE

- A. <u>Masonry Restoration Specialist</u>: Award masonry pointing to a firm regularly engaged in pointing masonry on historic buildings that can demonstrate to Owner's satisfaction that, within previous ten years, it has successfully performed and completed in a timely manner at least five projects similar in scope and type to work required on this Project involving buildings designated as Landmarks by local governmental authorities, buildings listed in the National Register of Historic Places, or buildings listed in a State Register of Historic Places under the direction of preservation authorities.
 - Foreman: Masonry pointing shall be directly supervised by a full-time foreman with experience equal to or greater than that required of Masonry Restoration Specialist. Same foreman shall remain on Project throughout work unless Owner deems foreman's performance unacceptable.
 - 2. <u>Mechanics</u>: Masonry pointing shall be carried out by a steady crew of skilled masons who are thoroughly experienced with materials and methods specified and have a minimum of three years' experience preparing and pointing joints in historic masonry similar to the work required by this Section. In acceptance or rejection of work of this Section, no allowance will be made for workers' inattention or lack of skill.
- B. <u>Testing of Workers</u>: Technicians proposed for raking and cutting joints in historic masonry of this Project shall be required to successfully complete six linear feet of

- raking and cutting mortar joints in presence of Architect prior to working on Project. One one-quarter-inch chip of masonry per linear yard will be standard of acceptable skill. Unsuccessful performance in this test area will be grounds for rejection of this technician for joint preparation and pointing work on this Project.
- C. <u>Laws, Codes, and Regulations</u>: Work of this Section shall comply with applicable federal, state, and local laws, codes, and regulations.
- D. <u>Referenced Standards</u>: Comply with applicable requirements and recommendations of the latest editions of the referenced standards listed herein, except as modified by more stringent requirements of the Contract Documents and of applicable laws, codes, and regulations. In each case in which there is conflict between requirements of referenced standards; requirements of laws, codes, and regulations; and requirements of this Section, the most stringent or restrictive requirement shall govern.
 - 1. <u>Brick Industry Association (BIA)</u>. Technical Notes 1, *Cold and Hot Weather Construction*, June, 2018.
- E. <u>Knowledge of Site and Project Conditions</u>: Before submitting bid, Bidders shall make themselves thoroughly familiar with the Drawings and Specifications, with the scope of this Project, and with conditions at the Project site relating to requirements of this Section and limitations under which the work will be performed and shall determine or verify dimensions and quantities. Submission of a bid shall be considered conclusive evidence that Contractor is thoroughly familiar with Project requirements and site conditions and limitations.
- F. Access for Observation and Approvals: Provide Architect access on a continuing basis to locations on which mock-ups are being carried out, on which work is ongoing, and where work has been completed to allow for observation and approvals. Provide pipe scaffolding and manpower to move and reconfigure scaffolding and planking, personnel lift and manpower to operate lift, or other means of access complying with laws and regulations regarding safety and acceptable to Architect. Provide manpower and equipment to facilitate observation and approvals.
 - Extent of Access: Provide Architect with hands-on access to each and every area of masonry surface that has been pointed. No approval of masonry pointing will be given before Architect is provided hands-on access to all surfaces that have been pointed. Provide access for reinspection of areas where work was not approved on first or subsequent inspections until Architect approves work.
 - 2. Relocation of Means of Access: If Contractor moves scaffolding, lift, or other means of access before providing Architect with hands-on access to each and every surface of masonry that has been pointed and to each and every masonry surface that has been pointed after previous pointing work was rejected, Contractor shall coordinate reinstallation of means of access to provide for close-up inspection by Architect at no additional cost to Owner.
- G. Restoration of Damaged Masonry Units: Repair or replace masonry units

damaged during masonry pointing work to Architect's satisfaction at no additional cost to Owner.

1.04 SUBMITTALS

- A. <u>General</u>: Submit the following in compliance with the requirements of the Contract Documents. Revise and resubmit each item as required to obtain Architect's approval.
- B. Qualification Data: Qualification data for firm and personnel specified in "Quality Assurance" Article that demonstrates that both firm and personnel have capabilities and experience complying with requirements specified. For firm and foreman, provide a list of at least five completed projects similar in size and scope to the work required on this Project. For each project list project name, address, architect, conservator, supervising preservation agency, scope of contractor's work, and other relevant information. Submit this information with the bid.
- C. Work Description: Detailed description for joint preparation and pointing of each masonry material and condition. Do not begin work on site until Work Description has been approved in writing. Submit new written descriptive information. Photocopies of Contract Documents, excerpts from Contract Documents, and/or duplication of text in Contract Documents will not be accepted for Work Description. Description for each condition shall include, but not be limited to:
 - 1. <u>Materials and Procedure</u>: Materials, methods, tools, and equipment to be used.
 - 2. <u>Protection</u>: Description, including drawings and diagrams, of proposed materials and methods of protection for preventing harm, damage, and deterioration caused by work of this Section to persons (whether involved in the Work or not), building elements, materials, and finishes, surrounding landscape and site, and the environment (including air and water).
 - Alternate Methods and Materials (If Any): Proposed alternate methods and materials (if any) to those specified for masonry pointing work. Provide evidence of successful use on comparable projects and demonstrate effectiveness for use on this Project.
- D. Work Proposal for Cold and Hot Weather Masonry: Proposal for executing masonry work as specified in other sections during cold weather and hot weather. Include proposed materials, equipment, methods, and procedures to ensure that cold weather masonry work and hot weather masonry work comply with requirements of this Section.
- E. Prepare mock-ups as specified in Article "Mock-Ups," below.

1.05 <u>MOCK-UPS</u>

A. <u>General</u>: Before beginning general masonry pointing, prepare mock-ups to provide standards for work of this Section. Do not proceed with masonry pointing until Architect has approved mock-ups.

- 1. Locate mock-ups as directed by Architect.
- 2. Notify Architect 48 hours prior to start of each mock-up.
- 3. Architect will monitor mock-ups. Mock-ups not performed in presence of Architect will be rejected.
- 4. Use crew that will execute the work and follow requirements of this Section.
- 5. Allow mock-ups using mortar to dry for seven days to allow mortar to reach final color and allow potential problems to appear. Notify Architect when mock-ups are ready for review.
- 6. Repeat mock-ups as necessary to obtain Architect's approval.
- 7. Protect approved mock-ups to ensure that they are without damage, deterioration, or alteration at time of Substantial Completion.
- 8. Approved mock-ups in undamaged condition at time of Substantial Completion may be incorporated into the Work.
- Approved mock-ups will represent minimum standards for masonry pointing.
 Subsequent masonry pointing work that does not meet standards of approved mock-ups will be rejected.

B. <u>Prepare the Following Mock-Ups</u>

- 1. Preparing Joints in Brick Masonry: One panel, minimum 25 sq. ft.
- 2. <u>Pointing of Joints in Brick Masonry</u>: One panel, minimum 25 sq. ft.

1.06 <u>DELIVERY, STORAGE, AND HANDLING</u>

- A. Deliver, store, and handle products and materials to prevent damage, deterioration, degradation, and intrusion of foreign material.
- B. Discard and remove from site deteriorated materials, contaminated materials, and products that have exceeded their expiration dates. Replace with fresh materials.

1.07 PROJECT CONDITIONS

- A. <u>Safety</u>: Use all means necessary to protect persons, whether or not involved in the work of this Section, from harm caused by or resulting from work of this Section.
 - 1. <u>Protection from Hazardous Materials</u>: Protect workers and other persons from contact with hazardous materials resulting from work of this Section.
 - a. Silica: Use procedures necessary to protect workers and other persons from exposure to respirable crystalline silica. All work should be performed in compliance with applicable OSHA regulations, including but not limited to "Respirable Crystalline Silica Standard" (Title 29, Code of Federal Regulations (CFR) Section 1926.1153) and with other

B. Protection of Building and Property

- 1. Protect adjacent elements and materials from damage and from deterioration during work of this Section. Provide all necessary protection and procedures to protect masonry not being pointed and all other elements and materials.
- Repair damage to elements and materials caused by masonry pointing work, using mechanics experienced in the respective type of work, to Architect's satisfaction at no additional cost.
- 3. Protect components of storm drainage systems against damage and blockage caused or accelerated by work of this Section. Clean out drains and other drainage elements that become clogged as a result of work of this Section.
- C. <u>Protection from Fire</u>: Take precautions necessary to prevent fire and spread of fire.
- D. Dust: Minimize dissemination of dust to greatest extent possible.
 - 1. Contractor shall hold Owner, Architect, and their consultants harmless from claims relating to dust resulting from work of this Section.
- E. <u>Protection of Masonry Being Pointed</u>: Protect existing masonry from damage during work of this Section. Take special care in removing existing mortar to ensure that no arrises are damaged, chipped, or broken. Contractor shall replace or repair masonry units damaged by work of this Section as directed by and to complete satisfaction of the Architect at no additional cost.
- F. <u>Protection from Staining</u>: Prevent mortar from staining face of masonry to be left exposed. Protect sills, ledges, and projections from mortar droppings. Immediately remove mortar in contact with masonry. Protect base of walls from rain splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
- G. <u>Protection from Rain</u>: Protect pointed joints with heavy waterproof sheeting from direct attack by rain or other precipitation for at least 24 hours after mortar has been applied. Do not anchor sheeting to masonry. Restore masonry damaged by installation or removal of sheeting.
- H. <u>Preconstruction Meeting</u>: Convene a preconstruction meeting to discuss masonry pointing and its effect on adjacent elements, materials, and finishes. Attendees shall include Owner's Representatives, Architect, firm(s) that will perform masonry pointing work, and other entities that might be affected by masonry pointing work.

1.08 <u>ENVIRONMENTAL CONDITIONS</u>

A. <u>Cold Weather Limitations on Use of Mortars</u>: Do not mix or use mortars when air or masonry temperature is below 40 deg F or when it is forecast to drop below 40 deg F within 72 hours of mortar application unless Architect has approved both

- Contractor's work proposal for cold- and hot-weather masonry work and also specific masonry work to be done in each instance.
- B. Hot Weather Limitations on Use of Mortars Do not mix or use mortars when temperature is above 100 deg F or when temperature is above 90 deg F and wind is above 8 mph, or when either of these conditions is forecast to occur within 72 hours of mortar application unless Architect has approved both Contractor's work proposal for cold- and hot-weather masonry work and also specific masonry work to be done in each instance.
- C. <u>Damage from Work in Cold Weather or in Hot Weather</u>: Remove work of this Section damaged by freezing during cold weather and/or damaged by premature or too-rapid drying during hot weather, properly prepare joint substrates, and provide new masonry work complying with the requirements of this Section at no additional cost to Owner.

PART 2 - PRODUCTS

2.01 <u>MORTAR</u>

A. Comply with requirements of Section 04 05 13.10 – "Restoration Mortars." Mortar for each type of masonry shall match existing original mortar in color, texture, and other visual qualities after the original mortar has been cleaned.

2.02 TOOLS FOR JOINT PREPARATION

- A. Hand Tools for Joint Preparation: Chisels, hammers, and mallets.
 - 1. <u>Thickness of Chisels</u>: Chisels used in masonry joints shall have a maximum thickness of 5/8 times joint width extending back from tip of chisel at least two-and-one-half times depth at which chisel will be inserted into joint.
 - 2. <u>Special Tools</u>: Provide special knives or special thin cutter blades for use in joints less than 1/8-inch wide.
- B. Power Tools for Joint Preparation: Standard tools and equipment, modified tools and equipment, and custom designed and fabricated tools and equipment as required to remove mortar from joints without damaging masonry units. Use power tools only under conditions described in Part 3, below and only if specifically approved by Architect. Failure to demonstrate that use of selected power tools removes mortar without damaging masonry units will result in prohibition of use of power tools and requirement that mortar be removed using hand tools only. If, after power tools have been approved for use in removing mortar, masonry units are damaged by the use of power tools, the further use of power tools will be prohibited and mortar shall be removed using hand tools only. Use power tools designed for cutting and grinding that have with integrated dust collectors to minimize dust whenever possible.
 - 1. <u>Electric Grinders</u>: Small, hand-held electric grinders with thin diamond or abrasive blades no greater than 1/16 inch thick and a maximum of 4-1/2-inch diameter.

- 2. <u>Pneumatic Die Grinders</u>: Specially modified pneumatic die grinders with thin diamond abrasive blades (0.060 inch thick). Subject to compliance with requirements, provide wafer blades as manufactured by CDP Diamond Products, Inc., P.O. Box 51727, Livonia, MI 48150 (800-521-0638), or approved equal.
- 3. <u>Custom Pneumatic Head and Chisels Designed for Mortar Removal</u>: Pneumatic head and thin carbide-tipped chisels specifically designed for removal of mortar from joints in historic masonry with air compressor, hoses, valves, and other equipment required to provide complete mortar removal system. Pneumatic head shall not have a retainer to hold chisels in place. Provide pneumatic head and chisels by Trow and Holden, 45 S. Main St., Barre, VT 05641 (800-451-4349), or approved equal.
 - a. <u>Chisels for Use in Narrow Joints</u>: Use custom ground thin carbide-tipped chisels for mortar removal from narrow joints.
- 4. Hand-Held Multipurpose Oscillating Tool with Diamond Blade: Multipurpose oscillating tool with thin diamond blade not exceeding 3/4 times width of joints designed for removal of grout and mortar. Provide Fein MultiMaster, manufactured by Fein Power Tools, Inc., 1030 Alcon Street, Pittsburgh, PA 15220 (877-771-0088); Dremel Multi-Max, manufactured by Dremel, 4915 21st St., Racine, WI 53406 (800-437-3635); Bosch Multi-Tool, manufactured by Robert Bosch Tool Corp., 1800 W. Central Rd., Mount Prospect, IL 60056 (224-232-2000); or approved equal, with appropriate diamond blades.
- C. <u>Brushes for Removing Dust and Dirt from Joints</u>: Stiff, natural- or synthetic-fiber bristle brushes. No metal brushes are acceptable.

2.03 MISCELLANEOUS MATERIALS AND EQUIPMENT

- A. Pointing Trowels: Long, thin pointing trowels narrower than joints being pointed.
 - 1. Fabricate special custom trowels for masonry pointing as necessary to ensure proper insertion and optimum compaction of mortar in thin joints.

PART 3 – EXECUTION

3.01 GENERAL PREPARATION

- A. <u>Examination</u>: Examine areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of work. Do not proceed until unsatisfactory conditions have been corrected.
- B. <u>Protection</u>: Erect dust impervious barriers and take other measures necessary to prevent dust from traveling beyond work platform before using power grinders, pneumatic chisels, other power tools, or hand methods that generate airborne dust.

- A. <u>Cold Weather Masonry Construction</u>: Take measures necessary, including, but not limited to, those specified herein, to ensure that masonry work in cold weather is not adversely affected by cold weather conditions and that no masonry work freezes until mortar has fully set.
 - General: Cold weather masonry work using cementitious mortars shall comply with the following requirements for work, performed in ambient temperatures indicated, as well as with the recommendations and guidelines in BIA Technical Notes 1, Cold and Hot Weather Construction, June, 2006. In case of conflict, most stringent and restrictive requirements shall govern.
 - a. <u>Prior Approval</u>: Work shall not be permitted when temperature of air or wall is at or below freezing or expected to go below freezing within 48 hours of work without Architect's prior written approval. No work shall begin when any part of wall or materials in use are frozen or subject to freezing temperatures.
 - b. Wetting Masonry Units: Wet masonry units with high rates of absorption with warm water: water above 70 deg F for masonry units above 32 deg F and water above 120 deg F for masonry units 32 deg F and below.
 - c. <u>Maximum Temperature of Water and Sand</u>: Do not heat water or sand above 140 deg F.
 - 2. Preparing for Masonry Work and Laying Masonry
 - a. Temperature below 40 deg F
 - Do not lay masonry units having a temperature below 32 deg F or containing frozen moisture, visible ice, or snow on their surface.
 - Remove ice and snow from top surfaces of existing construction on which masonry is to be installed and heat construction to a temperature of 32 deg F or above using methods that do not cause damage.
 - b. <u>Temperature Range 40 deg F to 32 deg F</u>: Heat mixing water and/or sand to produce mortar with a temperature between 40 deg F and 120 deg F and maintain temperature of mortar above 40 deg F until placed at that temperature.
 - c. Temperature Range 32 deg F to 25 deg F
 - Heat mixing water and/or sand to produce mortar with a temperature between 40 deg F and 120 deg F and maintain temperature of mortar above 40 deg F until placed at that temperature or above.

d. Temperature Range 25 deg F to 20 deg F

- 1) Heat masonry surfaces being pointed to 40 deg F and use wind breaks or enclosures when the wind velocity exceeds 15 mph.
- 2) Heat mixing water and/or sand to produce mortar with a temperature between 40 deg F and 120 deg F and maintain temperature of mortar above 40 deg F until placed at that temperature or above.

e. <u>Temperature 20 deg F and Below</u>

- 1) Provide enclosure and heat to maintain air temperatures above 32 deg F within enclosure.
- 2) Heat masonry units to 40 deg F or higher.
- 3) Heat mixing water and/or sand to produce mortar with a temperature between 40 deg F and 120 deg F and maintain temperature of mortar above 40 deg F until placed at that temperature or above.
- 3. <u>Protecting Completed Masonry Work</u>: Protect completed masonry work in the following manner depending on temperature ranges indicated, which apply to anticipated minimum night temperatures:
 - a. <u>Temperature Range 40 deg F to 25 deg F</u>: Completely cover masonry with weather-resistive membrane to protect it from rain or snow for at least 24 hours.
 - b. <u>Temperature Range 25 deg F to 20 deg F</u>: Completely cover masonry with weather-resistive insulating blankets or similar insulating protection for at least 24 hours.
 - c. <u>Temperature 20 deg F and Below</u>: Maintain masonry temperature above 32 deg F for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps, or other methods proven to be satisfactory.
- B. <u>Hot Weather Masonry Construction</u>: Take measures necessary, including, but not limited to, those specified herein, to ensure that masonry work in hot weather is not adversely affected by sun, heat, and/or wind and that no masonry work is subjected to conditions causing too-rapid or premature drying.
 - General: Hot weather masonry work using cementitious mortars shall adhere
 to following requirements for work, performed in ambient temperatures
 indicated, as well as all published guidelines in BIA Technical Notes 1, Cold
 and Hot Weather Construction, June, 2006. In case of conflict, the most
 stringent and restrictive requirements shall govern.
 - a. Prior Approval: Work shall not be permitted when temperature of air or

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- wall is at or above 100 deg F or when temperature of air is 90 deg F or above and the wind speed is 8 mph or greater without Architect's prior written approval.
- b. <u>Cool Water</u>: Cool water for mixing mortar, flushing mixers and containers, and other uses to regulate temperature of masonry work in hot weather shall be between 35 deg F and 45 deg F. Where ice is used to cool the water, the ice shall be completely melted before water is used for work of this Section.
- c. <u>Maximum Mortar Temperature</u>: Do not use mortar in which the temperature has exceeded 120 deg F. Check mortar temperature after mixing and before use. Discard mortar that has reached a temperature of 120 deg F or above and replace with fresh mortar complying with requirements of this Section.
- 2. <u>Preparing for Masonry Work and Laying Masonry</u>
 - a. <u>Temperature above 100 deg F or Temperature above 90 deg F with Wind 8 MPH or Greater</u>
 - Provide conditions and equipment necessary to produce mortar having a temperature below 120 deg F and maintain mortar temperature below 120 deg F until used in masonry work.
 - 2) Maintain sand piles in damp, loose condition.
 - 3) Shade materials and mixing equipment from direct sunlight.
 - 4) Flush mixer, containers used for transporting mortar, and mortar boards with cool water before they come in contact with mortar.
 - b. <u>Temperature above 115 deg F or Temperature above 105 deg F with</u> Wind 8 MPH or Greater
 - Provide conditions and equipment necessary to produce mortar having a temperature below 120 deg F and maintain mortar temperature below 120 deg F until used in masonry work.
 - 2) Maintain sand piles in damp, loose condition.
 - 3) Shade materials and mixing equipment from direct sunlight.
 - 4) Use cool mixing water for mortar.
 - 5) Flush mixer, containers used for transporting mortar, and mortar boards with cool water before they come in contact with mortar.
- 3. <u>Protecting Completed Masonry Work</u>: Protect completed masonry work using all materials and procedures necessary to protect mortars from too-rapid drying and from premature drying.

- a. <u>Temperature above 100 deg F or Temperature above 90 deg F with</u> Wind 8 MPH or Greater
 - Shading: Shade completed masonry work using tarpaulins or other approved methods to prevent exposure to sun and wind.
 - Wetting: Keep completed masonry work damp for at least 72 hours after masonry has been completed using one of the following:
 - a) Fog Spray: Fog spray completed masonry work until damp at least three times a day using water without iron and other contaminants that might adversely affect masonry. Do not use water stream or pressure that might wash binder from surface.
 - b) Water-Soaked Covers: Cover masonry work with wet burlap or other fabric covers and wet covers down as necessary to ensure that they are continuously damp using water without iron and other contaminants that might adversely affect masonry. Do not use water stream or pressure that might wash binder from surface of mortar.

3.03 JOINT PREPARATION FOR JOINTS CONTAINING MORTAR

- A. <u>General</u>: Remove mortar from joints to a depth of 3/4 inch, to 2-1/2 times width of joint, or to sound mortar, whichever is deepest. In all cases remove deteriorated, weathered, and loose material to sound mortar.
 - 1. Completely remove mortar from surfaces of masonry units adjoining joint to allow new mortar to bond directly with masonry units.
 - 2. Cut surface of mortar at rear of joint at a uniform depth from and parallel to wall surface.
 - 3. Do not damage faces or arrises of masonry units during joint preparation. Cease joint preparation work if, in Architect's judgment, masonry units are damaged by methods being used to prepare joints. Do not resume work until tools, workers, and methodology have been corrected to ensure that masonry units are not damaged and that work meets standard set by approved mock-up.
- B. Mortar Removal Using Hand Tools: Use hand tools for removal of mortar from head joints in brickwork, from other joints in stone and brick masonry that are less than 6 inches long, and from other joints in which use of power tools might damage masonry units. Use hand tools to complete mortar removal from joints where power tools have been used to partially remove mortar.
 - 1. For narrow joints of 1/8-inch or less in width, rake mortar from joints manually with a sharp knife blade or cutter made for this purpose. Cutter may be used with or without aid of a hammer.

2. Sharpen chisels as often as necessary to provide for optimum cutting of mortar and to minimize chipping but at least hourly.

C. Mortar Removal Using Power Tools

- 1. <u>Demonstrated Ability of Mechanics</u>: Prior to beginning work, demonstrate that workers using power tools are proficient in use of power tools for joint preparation. Failure to demonstrate to Architect's satisfaction that each worker is proficient in the use of each type of power tool proposed for use and that power tool joint preparation does not result in damage to masonry units shall result in prohibition of use of power tools for joint preparation. If proficiency is not demonstrated, or if work in progress results in damage to masonry to remain, power tool work shall cease, and joints shall be prepared for pointing using only hand-powered tools.
- 2. Rotary Power Tools: With Architect's specific prior approval following successful demonstrations of skill by mechanics, power grinders and/or pneumatic grinders may be used to partially remove mortar from horizontal (bed) joints in brick masonry and from joints longer than 6 inches in stone masonry where there is no danger of cutting into adjacent masonry units.
 - a. <u>Limitations on Use of Electric Power Grinders</u>: Do not use electric power grinders on joints less than 3/16-inch wide or less than 6 inches long or where ornament, elaborate profile, or other surface irregularity might make damage to masonry units likely.
 - b. <u>Limitations on Use of Modified Pneumatic Die Grinders</u>: Do not use modified pneumatic die grinders with custom thin blades on joints less than 1-1/2 times the width of the grinder blade.
 - c. <u>Extent of Mortar Removal Using Power Grinders</u>: Use power grinder only to score one kerf cut in center of each joint to depth of mortar removal required. Remove remaining mortar from sides of joint using hand tools or, if approved, pneumatically powered chisels.
 - 1) Stop kerf at least 4 inches from inside corners and projecting elements. Remove remaining mortar using hand tools or pneumatically powered chisels.
 - d. <u>Jigs</u>: Construct jigs to guide and limit power tools as necessary to prevent damage to adjacent masonry units.
- 3. Pneumatic Heads with Chisels: With Architect's specific prior approval following successful demonstrations of skill by mechanics, pneumatically powered chisels may be used to remove mortar from joints in place of hand tools. If work using pneumatically powered chisels results in damage to masonry to remain, work using pneumatic chisels shall cease, and joints shall be prepared using hand tools or other approved methods that do not result in damage to masonry units.
- 4. Hand-Held Multipurpose Oscillating Tool with Diamond Blades: With

Architect's specific prior approval following successful demonstrations of skill by mechanics, a hand-held multipurpose oscillating tool with diamond blades may be used to partially remove mortar from joints where there is no danger of cutting into adjacent masonry units. If work using multipurpose oscillating tool results in damage to masonry to remain, work using multipurpose oscillating tool shall cease, and joints shall be prepared using hand tools or other approved methods that do not result in damage to masonry units.

- D. <u>Cleaning</u>: Thoroughly remove loose mortar and foreign material from raked joints. Use care to ensure debris is not deposited in joints previously cleaned.
- E. Restoration and Replacement of Damaged Units: Repair and/or replace masonry units damaged during joint preparation to provide units in at least as good a condition as before joint preparation was begun to Architect's satisfaction at no additional cost to Owner.

3.04 MORTAR APPLICATION

- A. Wetting: Thoroughly drench masonry with water 24 hours prior to pointing joints. Thoroughly wet masonry again immediately before pointing joints and allow surfaces to dry slightly. At time of masonry pointing, surfaces shall be damp, so that they do not rapidly absorb moisture, but free of standing water (saturated, surface dry).
 - <u>Failure to Properly Wet Substrate</u>: Evidence that masonry to be pointed has
 not been properly dampened to prevent water in the mortar from being too
 rapidly absorbed by the masonry will be cause for Architect to reject pointing
 work. Remove rejected pointing, properly prepare joints for pointing, and
 provide new mortar to meet requirements of this Section at no additional cost
 to Owner.
- B. <u>Masonry Pointing</u>: Point joints as follows.
 - 1. Using a long, thin masonry pointing trowel, tightly pack mortar into joints in layers not exceeding 1/4-inch thick to fill joint to match original sound joints.
 - 2. Begin by filling areas from which mortar is missing to a depth greater than 3/4 inch in 3/8-inch-thick layers to within 3/4 inch of finished joint surface to provide a uniform substrate for final masonry pointing. Fill final 3/4-inch depth of joint continuously and uniformly in 1/4-inch-thick layers.
 - a. <u>Joints to Be Deep Pointed</u>: Install mortar to fill portions of joints more than 2 inches behind finished joint surface in layers not exceeding 1inch thick. Fill portions of joint between 3/4 inches behind the finished joint surface and 2 inches behind the finished joint surface in 3/8-inchthick layers to provide a uniform substrate for final masonry pointing. Fill final 3/4-inch depth of joint continuously and uniformly in 1/4-inchthick layers.
 - 3. Firmly iron each layer to compact mortar and ensure full bond between mortar and masonry units and a firm, solid joint.

- Allow each layer to reach leather hardness before applying succeeding layer.
 Do not let previous layer dry out before applying succeeding layer. Construct uniform joints.
- 5. Do not spread mortar over edges onto exposed surfaces of masonry units. Do not featheredge mortar.
- 6. When stopping work at end of each day or for other reasons, stagger layers of mortar so that there will be no through joints in mortar inserted into joints. Stagger joints in layers so that they are at least 3 inches from each other.
- 7. Where applying new work to that of a prior day, dampen previous work to ensure good bond.

3.05 JOINT TOOLING

- A. <u>Tooling</u>: After final layer of mortar is "leather hard," tool joints with a flat rule jointer, or as directed by Architect.
- B. <u>Profile</u>: Tool joints to profile as shown on Drawings or to match original joint profiles as directed by Architect. Solidly compress mortar so that it adheres well to masonry on both sides and forms a dense surface. Premature or late tooling will result in unacceptable finishes, which will be rejected.

3.06 CURING

- A. Keep newly pointed joints damp for at least 72 hours after mortar has been inserted. Do not apply a direct stream of water to joints for at least 7 days after mortar has been placed.
 - 1. Protecting Lime-Based Mortars: Provide damp burlap coverings or other damp cloths to protect mortars from premature drying and maintain tarps against wind, direct sun, and rain for specified minimum periods.
 - a. <u>NHL-3.5 Mortars</u>: Protect from drying for a minimum of 72 hours after installation.
- B. Ensure masonry temperature remains as required by specifications until mortar is thoroughly cured.

3.07 CLEANING AND REPAIR OF MORTAR JOINTS

- A. <u>Water Washing</u>: Wash pointed masonry with clean filtered water and nonabrasive hand tools to remove mortar debris from masonry surfaces. Do not use chemical cleaners.
 - 1. Wash within 72 hours after completion of masonry pointing.
 - 2. Use blunt-edged wood scrapers, soft natural bristle brushes, and rough towels along with water to remove mortar debris. Do not use wire brushes. Do not scratch joint surfaces.

- 3. Stop cleaning masonry unit surfaces free of misapplied mortar if methods and materials used damage pointed joints. Do not resume cleaning masonry free of misapplied mortar until methods and materials have been changed to avoid damage to mortar in joints.
- B. Repair of Pointed Joints: As cleaning progresses, examine joints to locate cracks, holes, and other defects. Carefully point up and fill such defects with mortar. Where joints are defective in opinion of Architect cut out joints to minimum depth of 3/4 inch, or two-and-one-half times joint width, whichever is greater; properly prepare joint substrates; and provide new pointing mortar exercising extreme care to ensure that color matches that of adjacent masonry pointing work. Exposed joint surfaces shall be free from protruding mortar, holes, pits, depressions, and other defects.

3.08 CORRECTIVE MEASURES

- A. <u>Correcting Unacceptable Joints</u>: Should a crack occur in any joint surface, should mortar separate from a masonry unit, indicating that it did not form a strong mechanical and chemical bond with the unit, or should Architect determine that for another reason masonry pointing work does not equal or exceed the minimum standard established by the approved mock-up, remove mortar to a minimum depth of 3/4 inch, properly prepare joint substrates, and repoint following requirements of this Section to Architect's satisfaction at no additional cost. At completion of work of this Section, joints shall be full of mortar soundly adhered to surfaces of masonry units at sides of joints and without defects.
- B. Repairing Damage: Repair damaged and deteriorated masonry resulting from work of this Section by patching damaged masonry units and/or replacing damaged masonry units to match original units to the satisfaction of the Architect at no additional cost to Owner.

END OF SECTION 04 05 13.91