

**US Army Corps of Engineers
Washington Aqueduct
Castle Gatehouse
Cultural Resources and Consultation Summary Report
16 August 2024**

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Attachment H: 2017 Final Design Scope, 2021 Scope Review MTFa Report

Attachment I: 2024 Atlantic Turret Report

1 Introduction

The purpose of this report is to summarize the current status of the US Army Corps of Engineers Baltimore District (USACE), Washington Aqueduct's (WA) Castle Gatehouse Renovation and Repair project in regard to the project's compliance with Section 106 of the National Historic Preservation Act (NHPA). It is a living document as additional details and information may come to light that need to be added. This report is being prepared in response to a situation that was identified on 2 August 2024 when it became clear that two of the four Castle Gatehouse (Castle) turrets had been disassembled down to their foundations. The DC Historic Preservation Office (DCHPO), the National Park Service – National Historic Landmark Review Team (NPS), and the Advisory Council on Historic Preservation (ACHP) were invited to consult to resolve this situation once it became clear that the work on these turrets was not in line with what had been previously consulted on with the DCHPO in the fall of 2023. Additional consulting parties may yet be identified. A 14-day Stop Work order was given to the construction contractor on 7 August 2024 (Attachment F). Despite the planned replacement with in-kind materials, USACE has determined that the removal of large amounts of the turret historic fabric has altered the undertaking from an extensive renovation to reconstruction of some of the major elements of the Castle. USACE has determined that the loss of the two turrets has resulted in an adverse effect to historic properties.

1.1 Project Summary

Work on the Castle is part of a larger Georgetown Reservoir Renovation/Repair Project that has been in progress for the past decade. The goals of the Georgetown Renovation work are to complete repairs to both the exterior and interior of each building on the site to support their long-term preservation and continued functional use. The buildings on site are the Castle Gatehouse, the Influent Gatehouse, the Meigs Vault, the West Shaft Gatehouse, and the Circular Platform. These buildings are functioning, utilitarian structures that serve the operations of the water distribution facility at the WA. The intent of the project was to complete the rehabilitation work following the *Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties*.

This USACE project is supported by an experienced team of professionals (Attachment E). Arcadis is the A/E designer. Traceries is their historic preservation subcontractor. Atlantic is the general contractor and mason. MTFa is the historic masonry consultant. Patuxent is Atlantic's structural consultant.

1.2 The Mission

The WA, a division of USACE, treats water drawn from the Potomac River to produce drinking water for Washington DC and portions of Northern Virginia. WA is unique in the Department of Defense, and possibly the Nation, in that the Federal government owns and operates a public utility. WA has the responsibility to provide safe, reliable, cost-effective drinking water to one million retail customers, through its three wholesale customers, 24 hours a day, seven days a week. WA is the sole source of potable water supply to most of the one million customers. The WA is a mission critical facility and must remain operational.

WA maintains and operates the Dalecarlia and McMillan Water Treatment Plants (WTPs). These systems are the sole source of water for Washington DC and are used for firefighting and drinking water for the entire city as well as parts of northern Virginia. Raw water diverted from the Potomac River flows via gravity to the Dalecarlia Forebay through two conduits that are approximately nine miles long. The water in the Forebay is pumped into the Dalecarlia Reservoir via a booster pumping station. The water from the Dalecarlia Reservoir is distributed to both the Dalecarlia Plant and via the Georgetown Reservoir to the McMillan Plant. The Georgetown Castle Gatehouse protects key elements of the water system, including sluice gates and traveling debris screens that control the flow of water from the Georgetown Reservoir, through the City Tunnel, to the McMillan Reservoir at the McMillan Water Treatment Plant (WTP). The

water flowing through the Georgetown Castle Gatehouse is the only source of water for the McMillan WTP and any interruption in service results in a full outage of the McMillan WTP until water flow can be restored.

2 The Undertaking:

This is a complex undertaking that has been evolving over the past decade as site conditions changed and funding became available (examples of scope expansion in Attachment H). Below is a summary of the repair work proposed for the buildings.

2.1 Previously Defined Undertaking

2.1.1 *Gatehouse Castle (aka 'Castle'):*

- Remove and replace damaged steel window and door lintels with stainless steel.
- Replace failing brick and mortar with in kind materials (Attachments B).
- Remove and replace exterior stucco- match color, texture, and dimensions (Attachment B).
- Remove and replace the exterior wythe of brick (only one wythe), so that the stucco can be successfully reapplied.
- Remove and replace existing roof system, ensuring the new system is structurally sound.
- Replace and rebuild damaged parapets and crenellations with new in-kind brick.
- Remove and replace existing damaged stairs that cannot be repaired.
- Restore historic doors.
- Replace existing restroom.
- Update outdated electrical and mechanical systems as needed.
- Repair rusting interior metal features.
- On interior, clean brick, repoint where needed, and replace deteriorated brick.
- Select windows, cut brick sill back to align with brick infill. Repoint and paint black before installing new windows based on historic images.

2.1.2 *Other Buildings on Site:*

Adjacent buildings on site are also part of the larger undertaking, the Influent Gatehouse, the Meigs Vault, the West Shaft Gatehouse, and the Circular Platform. At this time, USACE's understanding is that there has been no deviation for work on these buildings from what has been agreed to with the DCHPO. Work on these buildings includes:

- Clean Foundations and repair cracks.
- Remove non-historic doors and hardware and replace them with doors more sympathetic to the original door designs.
- Salvage the glass oculus at the Influent Gatehouse and at the Meigs Vault (Attachment D).
- Salvage the Meigs Vault Stairs (Attachment D).
- Repair and reinstall the oculi.
- Repair and repoint deteriorated brick where necessary.
- Replace the stucco on the exterior of the buildings - match color, texture, and dimensions.
- West Shaft Gatehouse- Remove exterior wyth of damaged brick and replace it in kind, so new stucco can be reapplied (agreed to in 2017 with DCHPO, see Attachment G).

2.2 The Present Undertaking as of August 2024: Castle Gatehouse Turrets

At this time, the proposed undertaking that requires resolution involves two parts:

2.2.1 *Reconstruct the southern two turrets.*

The turrets will be rebuilt using the original dimensions based on the exterior scan performed prior to removal of the stucco and field dimensions taken prior to removal of brick. The openings will be constructed to accommodate the new windows with full depth jams and new bearing stainless steel lintels. The vertical multi-wythe joint between the turret and main building structure will be fully toothed to provide a full depth structural connection between the elements. All brick will be installed level, plumb and in plane with fully mortared bed and head joints using the submitted and approved bricks and mortar. The mortar joints will be keyed to allow for the stucco scratch coat. (See Chapter 8 of this report.)

2.2.2 *Resolve the approach to repair, restore, or reconstruct the northern two turrets.*

These turrets may also need to be reconstructed if found to be in a similarly deteriorated state. The consulting parties and USACE must discuss the best approach for moving forward based on site conditions.

3 **The Area of Potential Effect (APE):**

The APE is defined as the limits of disturbance for the construction activities and those areas from which the work will be visible, including those areas off WA property where the buildings are visible to the public.

4 **Historic Properties:**

WA is a National Historic Landmark District (NHL). The NHL nomination package was updated in 2001 and sent to and accepted by NPS in 2002 (Attachment A), but it is unclear whether the package was finalized. USACE and NPS will work to resolve this administrative discrepancy.

The 2001 package established the period of significance for the Washington Aqueduct NHL as 1853 with the approval and initial construction under Meigs to 1880 through the completion of Meigs' plan for the water system. Although Meigs' direct involvement in the project lasted only until 1861 when he was appointed Quartermaster General of the U.S. Army, his plans were carried out by his successors with only minor modifications. The NHL period of significance includes those resources designed as part of Meigs' plan but built after his departure.

4.1 The Georgetown Reservoir Basin – Historic Property

The Georgetown Reservoir Basin (WA61) was begun in 1862, usable by 1864, and completed in 1873 when the interior walls were finally lined with stone paving to prevent erosion. It contributes to the NHL. The Georgetown Reservoir was originally designated the WA's Distributing Reservoir. Water was transported to this reservoir from the Receiving Reservoir at Dalecarlia. Like the Receiving Reservoir, the Distribution Reservoir provided an opportunity for sediment to settle out of the water. From the Distributing Reservoir, water was sent through pipes directly into the city's distribution system. The mains to the city were turned off in August 1905. After that date, all water held within the reservoir proceeded directly to the McMillan Reservoir and Filtration Plant where it was filtered, and then sent on for public use. The Georgetown Reservoir continues to serve as a settling reservoir for the McMillan facility. An earthen embankment divides the reservoir into northern and southern basins. The northern half is also divided. In 1864, the basin dividing wall was raised to the height of the outer walls; water flowed from the north basin to the south basin through a gate in the wall. During the 1940s, a cement floor was installed in the basin to allow deposited sediments to be collected with plows. Also, a series of baffle walls were constructed to improve sedimentation. These proved to be ineffective and were later removed. The Reservoir will not be impacted by the proposed undertaking.

4.2 Influent Gatehouse – Historic Property

Influent Gatehouse (GR1) contributes to the NHL. GR1 was constructed between 1864 and 1872 to regulate the flow of water into the Distributing Reservoir from the Receiving Reservoir. The gates in the building could also be adjusted so Dalecarlia water flowed into the Distributing Reservoir by-pass conduit rather than the reservoir. GR1 is a one-story, concrete, octagonal plan structure constructed on a granite sill foundation. Stucco on the building walls is scored to resemble cut stone. A plain cornice defines the roofline. A concrete dome shelters the interior. A wooden double door is located in the west elevation. No windows punctuate the building walls.

4.3 The Castle Gatehouse- Historic Property

The Castle Gatehouse (GR3) was included as a contributing resource in the 1973 NHL nomination but was revised in the 2001 nomination to be a non-contributing resource. This decision was based on more recent archival research that revealed that the gatehouse was built in 1901; a data sheet prepared by C.P. Heins of the U.S. Engineer Office, Washington, D.C., depicts a section, plan, and elevation of the structure. Since the Castle Gatehouse was not associated with the Meigs-era construction, it was not included as a contributing element of the NHL property. This building, however, was listed individually in the National Register in 1975 and the DC Inventory in 1974. The Castle Gatehouse is located at the southeast corner of the Georgetown Reservoir and was built to control water flow from Georgetown Reservoir to McMillan Reservoir, which was constructed during the same time. The one-story building, with second-story turrets at each corner, is perfectly symmetrical on all four elevations and was designed to reflect the insignia of USACE.

4.4 Meigs Vault- Historic Property

Meigs or Pipe Vault (GR7) is the enclosed stairwell that leads to the pipe vault where the old city water mains are located. It is still in use. It contributes to the NHL. The pipe vault is a brick -lined barrel vault constructed between 1862 and 1864. A 12 -inch, a 30-inch, and two 48 -inch iron mains lead through the pipe vault from the Effluent Gatehouse to the city distribution system. GR7 is a one-story, brick, hexagonal plan structure constructed on a Seneca sandstone foundation. Brick walls coursed in 6:1 American bond rise from the foundation to terminate at a dome roof. The wall exterior is stuccoed and scored to resemble cut stone. A metal entablature defines the roofline. No windows punctuate the building elevations. A single door is located in the northeast elevation. A transom infilled with stucco is situated above the door. A metal spiral staircase descends into the pipe vault. Each riser bears the inscription "M.C. Meigs." The pipe vault itself is a brick barrel vault and extends the width of the dam embankment. The pipe vault was a small ovular chamber prior to 1890. By 1890, the existing pipes were leaking into the dam embankment. To prevent erosion, the vault was extended the width of the embankment. During the twentieth century, electric lighting was installed within the pipe vault.

4.5 West Shaft Gatehouse – Not a Historic Property

The West Shaft Gatehouse (GR9) was constructed in 1901 to control the flow of water from the Castle Gatehouse into the Washington City Tunnel which leads to the McMillan Reservoir. The one-story, square building is composed of brick masonry walls with a stucco finished scored to resemble stone. The building falls outside of the Period of Significance of the NHL and is not individually listed on the DC Inventory of the National Register of Historic Places.

4.6 Effluent Gatehouse/Circular Platform- Not a Historic Property

The Circular Platform (WA62), which now functions as a gathering space and ceremonial platform, was initially constructed as the Effluent Screening Well House between 1864 and 1872. The original building was demolished between 1962 and 1970 (based on photographic research). The building was an exact replica of the Influent Gatehouse built to the north but was constructed to control the flow of water out of the reservoir. As the original building was razed, the platform is a non-contributing resource to the Washington Aqueduct NHL.

5 Previous Consultation Timeline:

This is to summarize the timeline and relevant documentation with respect to consultation with DCHPO and other parties since 2015 (Attachment G).

- 15 June 2015 EH Traceries prepares report describing scope of work to be submitted to DCHPO.
- 15 July 2015 Initial Comments received from DCHPO.
- April 2016 Final Design Drawings and Final Report from Traceries submitted to DCHPO, Commission of Fine Arts (CFA) and National Capital Planning Commission (NCPC).
- 14 September 2016 Traceries informs DCHPO regarding USACE request to replace all of the stucco
- 22 April 2016 CFA Approval Received
- 26 April 2016 DCHPO provided comments on revised report and plan drawings
- 17 May 2016 NCPC Exception Letter received
- 03 December 2015 Andrew Lewis of DCHPO makes site visit to Georgetown Reservoir and sends additional comments via email on 04 December 2015
- 21 February 2017 Traceries prepares revised final report and submits to DCHPO, comments from DCHPO received 15 March 2017
- 19 May 2017 Traceries makes revisions to report and submits to DCHPO, Final “No Adverse Effect” Email from DCHPO received 27 June 2017
- 27 July 2017 Traceries informs DCHPO regarding the degraded condition of the oculus at the Influent Gatehouse.
- 27 July 2017 DCHPO requests photographs to document deteriorated condition and discusses if the oculus is deteriorated beyond repair, that the historic element should be preserved by designing the new component in a way that minimizes alterations to the historic fabric and also minimizes the visibility of the new structural piece.
- 28 July 2017 Traceries sent pictures and confirms that the oculus is deteriorated beyond repair.
- 02 August 2017 Traceries makes a site visit and prepares a memorandum detailing the deterioration of the influent gatehouse oculus, influent gatehouse cornice and castle gatehouse doors.
- 27 October 2017 Traceries notified DCHPO that the West Shaft Gatehouse stucco had been removed and that 75-80% of the brick underneath would not be able to handle to new stucco application. Missing pieces of the Influent Gatehouse oculus would be replaced, and existing features would be preserved.
- 30 October 2017 DCHPO asked for photos and documentation of the deterioration but agreed that replacement and new coat of stucco was an appropriate path forward.
- 1 November 2017 Traceries sent pictures and confirmed that it was just the exterior brick on the West Shaft Gatehouse that was in poor condition.
- 2 November 2017 Traceries and Arcadis propose to replace in kind the exterior brick and reapply the stucco.
- 3 November 2017 DCHPO requested drawings showing where the in kind brick replacement would be to help track changes to the building for the admin record. Traceries confirmed that only the exterior wythe would be replaced.
- 21 February 2018 Traceries conducts a site visit to inspect brick conditions at the Meig’s Vault and prepares memo detailing deteriorated condition of bricks.
- 19 July 2018 Traceries conducts a site visit and prepares a memo summarizing the mockups prepared by the contractor. Traceries notes that newly pointed brick in West Shaft Gatehouse should be pointed with a raked mortar joint, four stucco samples at the castle gatehouse were not viable due to rough finish, and gaps in the connections between the cornice pieces are unacceptable and the cornice will need to be reinstalled so that they are watertight. This work was performed by the

previous construction contractor. (A previous construction contractor was on the job before Atlantic took over the job.)

- Between late 2018 and early 2021, there is a break in the project where no work was being performed due to change in construction contractor.
- 24 March 2022 WA and BAO determined that a design from Arcadis for the removal and replacement of the crenellations and parapets is needed. This need stemmed from the initial structural concerns the contractor raised during the stucco work, and which ultimately resulted in a stop work order.
- 13 April 2022 WA informs Arcadis of the need for a design to address removal and replacement of crenellations and parapets
- 29 September 2022 Arcadis submits plan drawings and specifications for the design of crenellation and parapet replacement. This is the basis for Change AW.
- 11 October 2022 Tracerics submits plans and specifications to DCHPO regarding the poor conditions of the crenellations. Plans and specifications propose removing the extant brick and replacing crenellations with pre-cast concrete to match dimensions.
- 27 October 2022 DCHPO rejects the use of pre-cast concrete to rebuild the crenellations and provides 3 reasons for the rejection. 1. The building is a NHL, 2. Precast concrete would fail to meet the Secretary's Standards because it is not true "in kind" replacement and 3. The difference in costs/labor for brick vs precast concrete is insignificant given the limited area of repair.
- 30 November 2022 Tracerics responds to DCHPO with pictures and confirms existing lower crenellations are concrete on a brick base, upper crenellations appear to be of brick construction. Approach for reconstruction of crenellations will be to replace portions that are concrete with concrete and those constructed of brick with brick.
- 30 November 2022 DCHPO responds that they have no objection with this approach.
- July 2023 RFI-074 was received and transmitted to Arcadis
- 20 July 2023 RFI-075 was received and transmitted to Arcadis
- 30 August 2023 Arcadis responds to Stucco Mockup Submittal
- September 2023 Arcadis provides response to RFI-075
- September 2023 Tracerics provides photographs of the stucco mockups for DCHPO approval.
- 4 October 2023 DCHPO reviewed the photographs and did not have any significant concerns with the appearance of the stucco but recommended double checking historic photographs to determine whether a raked or a beaded joint was used.
- October 2023 Tracerics responds that historical photographs from 2014 prior to any work, showed raked scoring and not a beaded joint.
- October 2023 DCHPO had no further questions and requests Tracerics confirm if there were any other actions outstanding.
- October 2023 Tracerics confirmed that only the stucco mockup approval was the last item remaining.
- 10 October 2023 DCHPO notes that since their concerns regarding the stucco have been resolved, the stucco work will be signed off as "no adverse effect."
- 10 November 2023 Tracerics contacts DCHPO regarding discovery of remains of steel trusses found in the turret walls and discusses poor drainage of the roofs. The preliminary turret roof design from Arcadis is attached and the new cone shaped roof design is discussed.
- 14 November 2023 DCHPO reviews the plans and agrees that the proposed approach is appropriate and may have been the original roof design before the trusses were removed. DCHPO determines the additional work in the design as "No Adverse Effect."
- December 2023 Arcadis submits Turret Design Change drawings. This becomes the basis for Change BB.

6 The Turrets: Change BB and Deviation from Change BB

After removing exterior stucco from part of the Castle Gatehouse, Atlantic's historic masonry consultant, MTFA, inspected the site to evaluate the work and overall building conditions. The consultant documented their observations and findings in a report dated [05/17/21] which highlighted unstable areas with cracked and deteriorated masonry, presenting structural and safety concerns for the Castle Gatehouse. MTFA advised that a structural engineering firm should assess the building's structural condition before further work proceeds. Based on the MTFA report, the USACE team performed a site inspection and subsequently issued a Stop Work order for all stucco removal work at the Castle Gatehouse due to "safety concerns with the integrity of the structure (dated 05/21/21). Following MTFA's advice, Atlantic engaged Patuxent Engineering, who confirmed MTFA's findings and determined that stabilization was necessary before any additional stucco removal could take place (Attachment I).

The primary structural concern was the parapets and corbels were not stable and posed a risk to the overall structural stability of the building. Arcadis was engaged by USACE to independently verify the structural integrity of the building. Arcadis inspected the building and recommended removing and replacing the existing parapets – resulting in Change AB (executed on 06/06/2023) and USACE lifting the suspension. As noted in the section above, Change AB was properly consulted with the DCHPO. Included in this change was permission to remove all stucco and inspect the condition of the underlying bricks. As a result of this removal and inspection, Atlantic subsequently sent RFIs 74, 75, and 77 on 06/30/2022, 07/19/2023, and 09/09/2023, respectively. The photographs provided in the RFIs revealed severe cracking and delamination at the exterior walls, with many cracks extending through full depth. Additionally, it was observed that the bricks around the window areas were separating due to inconsistent laying (Attachment I).

MTFA inspected the newly exposed bricks and issued a report on 08/14/2023 with their recommendations to replace most of the exterior bricks in the turrets due to loss of fire skin, loss of structural section, and broken bricks. MTFA sounded the bricks with a rubber mallet and found that "many of the bricks have sheared about ¼" behind the fire skin of the bricks and added "perhaps the point of shear is the point where the density of the brick changes from the sintered fire skin to the more porous brick biscuit. This indicates that many of the bricks may look sound but in fact have lost their integrity where the porous biscuit is exposed". Based on the above, MTFA recommended replacing the damaged bricks to stabilize the Castle Gatehouse in order to "allow the wall system to function for another several decades and the moisture deterioration mechanism gets reset and the building will be able to withstand its harsh environment for longer". MTFA added that "Replacement of damaged brick will allow the stucco to maintain proper adhesion and reduce risk of delamination due to failed bond with disintegrating brick. This will ensure the stucco performs uniformly across the exterior." (Attachment I)

Based on MTFA's recommendation and the USACE/Arcadis site visit on 08/16/2023, Arcadis issued their design for removing and replacing the existing crenellations and corbels on the turrets as part of Change BB. They also required the removal and replacement of loose mortar and cracked bricks in order to provide sound and stable support for the new bricks/roof. In response to the RFP for Change BB, Atlantic submitted marked up drawings to show provisions for full-depth and partial depth removal of bricks on the turret consistent with the RFP and as agreed with the USACE (Attachment I). See Chapter 5 of this report and Attachment G for associated consultation records. Material specs can be found in Attachment B.

Based on the above inspection by MTFA, and scope of work of Change BB and examination of the bricks during removal and replacement work on the turrets, Atlantic determined that the majority of the existing bricks were not salvageable due to the loss of greater than 50% of their fire skin, loss of structural integrity, thru cracks, and loss of consistent dimension. These deficiencies in the existing brick prevent the historic materials from being incorporated into the rebuilt structure in compliance with the contract documents (Attachment I).

The intended approach to executing Change BB included significant and complicated shoring to attempt to stabilize several sections of the turrets in-place while other sections were renovated following the guidelines for decisions on brick useability. Upon commencing construction, the Atlantic team found it nearly impossible to retain the section of the turret between the upper and lower windows and between the upper windows and roof corbels during the brick replacement work due to the pervasive and consistent presence of deteriorated and unusable bricks and loose mortar and the discovery that the steel elements that were connecting the main building to the turrets had suffered severe corrosion. The steel element corrosion included severe rusting and section loss, resulting in “rust jacking” and associated significant failure cracking in the adjacent turret walls that affected their fundamental structural integrity. Additionally, in order to remove and replace the corroded steel lintels above the windows as part of the original contract scope, Atlantic had to remove 3 or 4 courses of full depth masonry to extract the steel lintels. The configuration of these lintels included a steel shelf and half-moon shaped vertical plate element that tied into the four courses of brick directly above the window. The shoring approach proposed for the Change BB work required revision based on the field discoveries noted above. The revised shoring needed to maintain the balance of the area would require the further deliberate destruction of the existing bricks in order to install “needle beams” to support the shoring system through the turret walls, necessitating the subsequent replacement of the bricks in each hole created by each needle beam. Consequently, Atlantic made the decision to remove the existing bricks full depth between the windows for the safety of the crew and stability of the entire building structure. This approach will ensure a more structurally stable turret, enhancing its durability and longevity for the building (Attachment I).

7 Southern Turret Structural Concerns as of August 2024

At the time of this report, the southern two turrets remain down placing the rest of the building at risk for structural failure. This chapter summarizes USACE’s concerns if the two turrets are not rebuilt immediately.

7.1 Georgetown Castle Gatehouse - Original Structural System

The overall structural system of the Georgetown Castle Gatehouse consists of four multi-wythe brick masonry bearing walls connected integrally at building corners by four circular brick masonry turrets. These walls and turrets together support a structural steel system of roof joists that bears on the four masonry walls. The joists support metal roof deck and the roofing system for the building. The masonry walls and turrets perform dual function for this structure, acting as both the gravity and lateral system elements.

Structural gravity elements are structural members that support or resist primarily vertical forces. Gravity members support their own self-weight and support the weight of other building elements and loads that act in the vertical direction, such as snow, rain, or occupants. In the case of the Castle Gatehouse structure, the primary structural gravity members are the four perimeter walls and four corner turrets. Continuity of material properties are critical when considering the stability and performance of gravity elements. The common saying “a chain is only as strong as its weakest link” applies here. When a structure is supporting gravity loads, the load accumulates from the highest point downwards to the ground where it is typically transferred via a foundation to the earth. If poor or deteriorated material exists within a structural bearing wall, the deteriorated area will become the weak point of the system and will govern the overall design, capacity, and serviceability of the structure. The Castle Gatehouse is a masonry structure. The masonry walls must be constructed of sound material and tied together at appropriate points to create continuity.

Lateral structural elements prevent the structure from significantly moving in a lateral direction (deflecting). The two primary lateral considerations are wind and seismic loads. In a typical 4-sided structure, the wind will blow onto the plane of a wall which will then transfer load via structural stiffness to a wall which runs parallel to the wind direction. A lateral system cannot function without a continuous path to transfer load between system elements. In the case of the Castle Gatehouse, the entire building perimeter acts as the

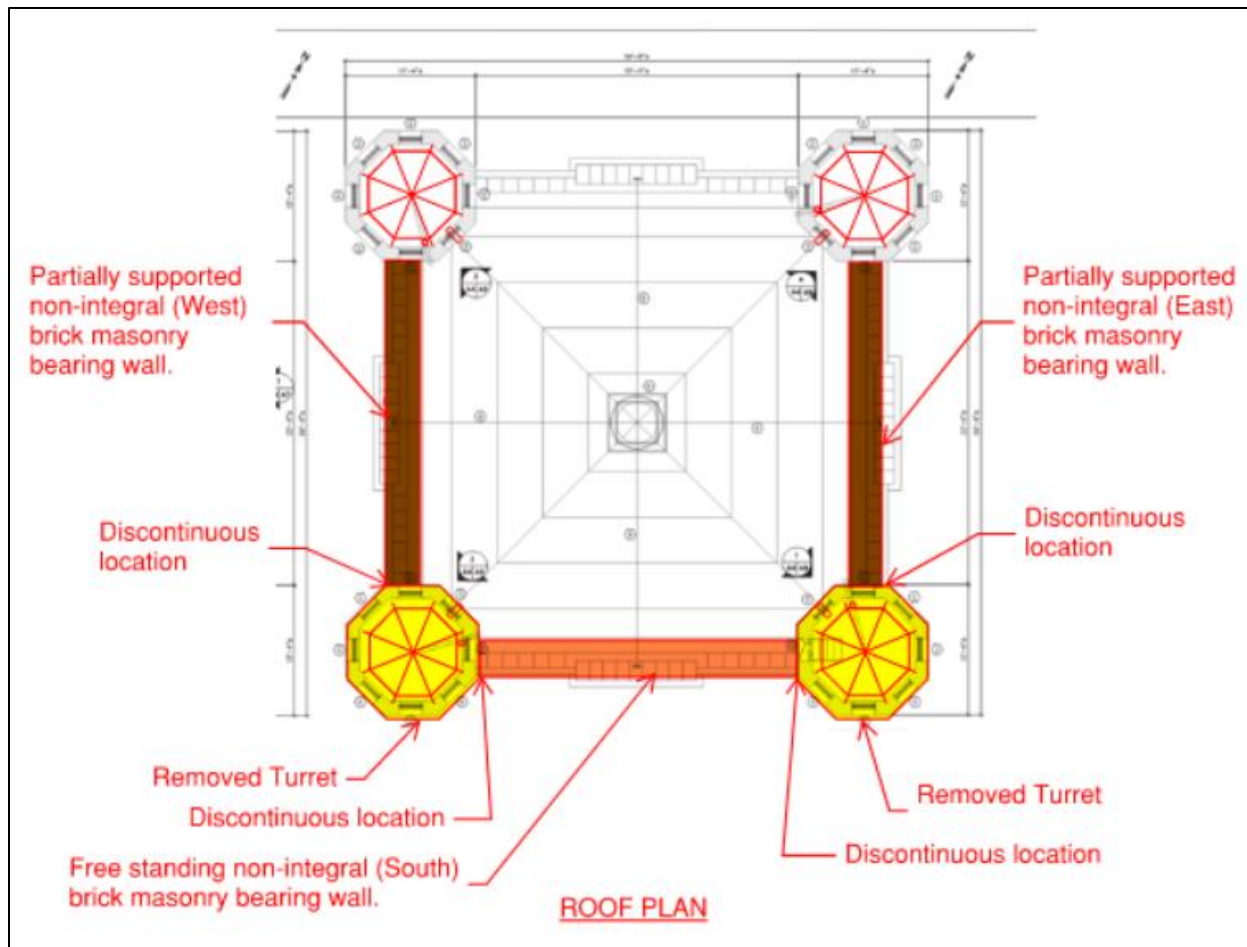
lateral stability system for the building, including the four primary masonry walls and the four corner masonry turrets. The corner turrets provide the continuity at wall intersections and interlock the system around the perimeter of the building. A discontinuity in the system, e.g. an interruption, will prevent load transfer and the lateral loads will be absorbed by parts of the structure that are not designed or capable of properly withstanding such a force.

The original design intent for these brick masonry walls was to be supported at the roof, foundation and each wall intersection by way of rigid turret elements providing the rigidity and stiffness required such that the four walls act in unison as a system. The overall stability of masonry structures, like this one, depend on the interlocking continuity of the masonry throughout the structure without interruption. Interruptions can include sections of deteriorated material or interruptions created by demolition work.

7.2 Georgetown Castle Gatehouse - Existing Structural System Observations

Field observations revealed that the existing (unmodified) multi-wythe wall construction at the existing turrets did not utilize interlocking techniques for old brick masonry (e.g. the walls were not constructed properly at the time of their installation). The walls were observed to be held together with friction, mortar adhesion and adjacent interactions. This makes the existing walls non-uniform and more prone to differential movements, deflections, and failures. In addition, existing masonry at the corner turrets was observed to be in poor condition, which is not unexpected for 123-year-old masonry. The deterioration interrupts the ability of the wall to act as a single structural element to both resist and transfer loads through the structural system.

The larger structural concern is the global stability of the structure and the observed lateral load path interruptions. Now that two of the four turrets have been demolished, the local stability of three of the four walls is in jeopardy and the global stability of the structure is compromised. The south wall is acting as a free-standing wall due to the removal of the southeast and southwest corner turrets. These turrets acted as the structural intersections with the east and west walls and the east and west supports. Without these supports, this wall cannot transfer lateral loads to the building system and is therefore resisting loads that would normally be transferred safely to other elements. The wall itself is not designed for, and is not capable of, resisting such loads without damage and eventual collapse. The east and west walls have similar stability concerns as they do not have the means to transfer lateral loads in the east-west direction into the southern wall, adding additional stress to the system without a clear load path to the southern wall. In the current condition, the east and west wall load path is approximately twice as long as it was when the turrets were whole. The loss of continuity amplifies structural stresses and deflections. In the event of any wind storm or seismic activity the discontinuity and stability issues will result in cracking and other damage throughout the masonry structure and could result in catastrophic failure including collapse.



The current situation at the Castle Gatehouse requires immediate action to prevent unintended adverse effects on the historic structure that will result from any lateral loading that occurs while the two southern turrets are in their current demolished condition. The demolished condition dramatically interrupts the structural lateral system. Any significant wind or seismic load on the structure, such as from a severe thunderstorm, tropical storm or hurricane, or an earthquake of any magnitude will result in unintended movement throughout the remaining masonry structure. The result of such movement is deflection and cracking of the remaining walls and turrets, some of which could be catastrophic.

7.3 Georgetown Castle Gatehouse - Immediate Decision Needed for Stabilization

It is critical from a structural perspective that the continuity and structural integrity of the masonry system be reestablished by reconstructing the turrets and therefore restoring the structural stability of the overall building system. Additionally, localized or complete structural collapse will result in a complete outage of the McMillan WTP. The water storage capacity at the existing McMillan WTP clearwells is not adequate to cover an outage beyond a few hours of duration and will create interruption to the critical water supply for Washington DC and parts of Northern Virginia. The Government proposes to reconstruct the two demolished southern turrets using appropriate materials and methods with in kind materials, matching the footprint, portions, design, and appearance of what was removed.

8 Effect Determination:

USACE has determined that the proposed undertaking will have an adverse effect on historic properties due to impacts to the Castle’s historic integrity, specifically the removal and reconstruction of the castle turrets. A letter was sent by USACE to ACHP, DCHPO, and NPS on 15 August 2024 stating this finding. At the time of this report, the stucco on the entire castle has been removed; the two southern turrets are completely down to their bases; one of the northern turrets has been dismantled about one third of the way down; and the other northern turret has not been disassembled and is intact.

The adverse effect finding is specific to the Castle Gatehouse and does not include the ongoing work on other buildings on site.

8.1 Definition of an Adverse Effect:

“An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.” 36CFR800.5(a)(1)

8.2 Aspects of Integrity Discussion:

Aspect of Integrity	Diminished? Y/N	Discussion (Pending Concurrence from DCHPO)
Location	No	The Location of the Castle will not be adversely impacted by the proposed undertaking. The Castle will remain within its original footprint.
Design	No	Overall, the Design of the Castle will not be adversely impacted by the proposed undertaking. While some internal structural features may be improved to better stabilize the building, the exterior and interior appearance of the castle will be retained, or in some cases recreated, to match the original intended design. The style, layout, proportions, and details of the castle will be retained.
Setting	No	The Setting of the Castle will not be impacted by the proposed undertaking. The surrounding landscape and physical environment will not be affected by the proposed undertaking.
Materials	Yes	Due to the condition of the brick, concrete, stucco, mortar, and structural stability of the building, much of the original fabric of the Castle walls will need extensive repair, and in some cases, complete replacement. While these features will be rebuilt or replaced in kind, the inability to salvage a significant amount of the historic materials will result in an adverse effect to this aspect of integrity.
Workmanship	Yes	As many of the features of the building are having to undergo major repairs or replacement of materials (turrets), some evidence of the original workmanship will inevitably be lost.

Feeling	No	The Feeling of the castle will not be adversely impacted by the proposed undertaking. Once restored, the Castle will still retain the feeling and aesthetics of a turn of the 20th century historic property and WA, especially within the interior of the building.
Association	No	The Association of the Castle will not be adversely impacted by the proposed undertaking. The castle will continue to function as a working gatehouse of the WA.

8.3 Resolution of Adverse Effects

In accordance with 36 CRF Part 800, the next step is to resolve adverse effects through consultation and by identifying appropriate mitigation that will be memorialized as stipulations in a Memorandum of Agreement (MOA). The ACHP is providing regulatory guidance to assist USACE in resolving this process appropriately.

8.3.1 *Southern Turrets*

In a call on 15 August with DCHPO and ACHP and in a follow-on letter dated 15 August 2024 to NPS, ACHP, and DCHPO, USACE provided the summary of the structural stability concerns for the southern two turrets presented in Chapter 7 of this report. It was acknowledged by all parties on the call, that, if left in its present condition, the building is at risk of further damage. In order to preserve the remaining historic structure and prevent further unintended adverse effects to this historic property and to address life safety concerns and prevent any unintended outages to the McMillan WTP, USACE has concluded that it is critical that these structural elements be restored without further delay. USACE proposes to direct the construction contractor to resume turret reconstruction before the stop work order ends on 21 August to prevent further structural damage to the Castle. USACE intends for the turret reconstruction to take place concurrently with continued consultation and the drafting of the MOA.

8.3.2 *Northern Turrets*

USACE is analyzing the current conditions and possible alternatives for repairs to be completed to the northern turrets. The team is weighing different options to try to minimize additional adverse effects to the Castle. USACE will work with the consulting parties to find the best path forward for the long-term survival of this historic property.

8.3.3 *MOA and Mitigation*

USACE’s understanding of Next Steps for the MOA:

- The ACHP as a consulting party has already been notified of the adverse effect; USACE would like to confirm whether an e106 package needs to be prepared and formally submitted.
- Advertise to the public the finding of an adverse effect.
- Identify and invite additional consulting parties with assistance from DCHPO in identifying appropriate parties.
- Memorialize decisions made for the turrets’ reconstruction and repair in the MOA.
- Receive feedback on suggested mitigation (documentation, public educational content, etc.).
- USACE will draft a MOA for the consulting parties to review.
- Once language is agreed upon, the MOA will be signed by COL Pera, then circulated to other parties for signature.