West Boundary Wall Repair, Arlington National Cemetery, Arlington County, Virginia

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Purpose and Need for the Undertaking

Parts of the western portion of the Boundary Wall between Arlington National Cemetery (ANC) and Joint Base Myer-Henderson Hall (JBM-HH), from the Old Post Chapel Gate to the southwest corner of the cemetery are crumbling and need to be rebuilt. Soil has accumulated on sections of the wall, mostly on outside of ANC. These sections of the wall have in effect become a retaining wall, which it was not designed for. As a result, some locations have collapsed, and others are showing signs that collapse may be forthcoming. Smaller, routine repairs of the wall have been inconsistent; resulting in a patchy conglomeration of different mortars applied with varying techniques, and sometimes mismatched stone in other parts of the Boundary Wall.

ANC has identified the ad hoc, piecemeal approach to maintaining the Boundary Wall as a reason for these shortfalls in the condition of the wall and quality of the repairs. Rather than meet maintenance and repair needs of the western Boundary Wall reactively, with limited repairs going on indefinitely, ANC has decided to reconstruct a large portion of the Boundary Wall. Due to the change to internal design, and complete reconstruction of the wall, the ANC Cultural Resource Manager determined that this undertaking does not fall under the Programmatic Agreement for Operations, Maintenance, and Repair, and must be reviewed under the standard Section 106 process.

Area of Potential Effects and Resources

This project will have a direct physical effect on the Boundary Walls of Arlington National Cemetery on its western perimeter, described below. This is a total of 6960 linear feet of the Boundary Wall (not including gates and associated posts and abutments). The ground disturbance Area of Potential Effects (APE) is discussed following the Description of the Undertaking.

The Boundary Wall of Arlington National Cemetery contributes to the Arlington National Cemetery Historic District, listed on the National Register of Historic Places (NRHP) (DHR# 000-0042), and the Boundary Wall is within the landscape site and viewshed of the ANC historic district (Smith et al. 2013). The NRHP listed Fort Myer Historic District (DHR # 000-0004) is 146 feet north of the northern end of the proposed undertaking, but due to the angle of the wall and intervening structures and trees, the portions of the Boundary Wall subject to this undertaking is not considered here to be within the viewshed of the Fort Myer historic district.

Existing Boundary Wall, History and Conditions

In 1867 Congress enacted legislation regarding National Cemeteries that included a provision "to enclose every National Cemetery with a good and substantial stone or iron fence." The Army Quartermaster Corps, which managed ANC at the time, chose a stone wall made of red sandstone from the Seneca Quarry in Montgomery County, Maryland capped with 'bluestone' coping slabs. Seneca sandstone is reddish brown sandstone originating from Triassic lacustrine and riverine sediments in Triassic Period basin formations found from northern Virginia through northern New Jersey. Bluestone is a common name for a fine grained felsic sandstone or siltstone of medium to dark bluish-gray color. It is defined as a felspathic greywacke, formed from deposits in the 350 million year old Devonian Period Catskill Delta. It was a widely popular decorative building stone in the 19th century, quarried in eastern New York, Pennsylvania, and northern New Jersey.

The original 200 acres of Arlington National Cemetery were bounded by this wall, constructed during the 1870's and thought to have been completed by 1879 (Beyer, Binder, and Belle 2013). In 1888 the Government foreclosed on the Freedmen's Village and homesteads at the southern end of the former Arlington estate. The foreclosure was delayed by court challenges, but by 1897 ANC had the southern portion of the red sandstone Boundary Wall dismantled, and the materials used to reconstruct the wall at the western boundary of the new area. This reconstructed wall extends about 2700 feet from Farragut Drive and the Selfridge Gate, southward to the location of the Argonne Cross (Smith et al 2012). As the supply of salvaged Seneca sandstone ran out, a blue-grey stone was substituted for the wall enclosing the remainder of the new area. This stone is similar in appearance to stone known commercially as "carderock" a mica-schist quartzite quarried in Montgomery County, Maryland; however the "carderock" quarry has only operated since 1927 and the blue-grey stone of the Boundary Wall may be of different composition and geographic origin. By 1897 the expanded cemetery was enclosed by existing or reconstructed red sandstone wall, and by newly constructed 'blue-grey' stone wall (Smith et al 2012) covering the southwestern and southern boundary (Figure 1).

Over the years ANC has conducted repointing campaigns using varying mortars and techniques. This has resulted in a very 'patchy' appearance of most sections of the wall. Along with the inappropriate mortar, often 3-4 different types in the same area, application was often poorly crafted.

The worst problems with the integrity of the wall occur where soil has accumulated against the wall, varying with the ground level on the opposite side of the wall. Generally the soil build up is on the JBM-HH side of the wall, but in some places it has built up on the cemetery side. At least some of this is due to natural processes of alluviation and bioturbation (action of ants, worms, etc.), but accumulations of up to six feet suggest that fill has been deposited during various construction projects at JBM-HH. Where soil has built up against one side of the wall, moisture and force have resulted in decay and even collapse. This is most evident in a section of the original ca. 1879 part of the wall between Meigs Drive and Farragut Drive (Figures 1 and 4).

Photograph numbers are keyed to locations in Figure 1.

Photo 1 - (Figure 2) A view north toward the Old Post Chapel along McPherson Drive, showing earth banked up on the cemetery side.

Photo 2 - (Figure 3) Another view north along McPherson Drive showing 1-1.5 feet more soil on the JBM-HH side of the wall.

Photo 3 - (Figure 4) A collapsed section of wall just south of McPherson Drive. The lamp post base on the JBM-HH side relative to the ground level on the ANC side illustrates soil build up.

Photo 4 - (Figure 5) A 90 foot section of wall reconstructed in 2009 using the same design proposed by this project.

Photo 5 - (Figure 6) An old and inappropriate repair to the red sandstone wall, using mismatched mortar and even brick.

Photo 6 - (Figure 7) A typical section of the segment of the red sandstone wall relocated ca. 1897.

Photo 7 - (Figure 8) Although it is contemporaneous with the segment shown in Photo 6, and a short distance away, the wall is much lower here. This is probably due to soil accumulation on both sides of the wall.

Photo 8 - (Figure 9) Transition from the relocated red sandstone wall to the blue-grey stone wall.

Photo 9 - (Figure 10) The "Rusted Gate," where a section of chain link fencing was expediently mortared into joints in the stone wall some decades ago.

Photo 10 - (Figure 11) A section of the blue-grey stone wall along Hobson Drive. The wall is low here, probably represents soil accumulation on both sides.

Photo 11 - (Figure 12) An old and inappropriate repair to the blue-grey stone wall using mismatched mortar hastily applied.

Photo 12 - (Figure 13) A section of wall along Hobson Drive behind Henderson Hall. Compare this with the height of the wall in Photo 13, which is just to the southeast of it.

Photo 13 - (Figure 14) Facing southeast along Hobson Drive toward JBM-HH Gate 3. Higher ground level on the JBM-HH side is readily apparent, and soil has apparently accumulated on both sides with the ground level high relative to the wall on the ANC side as well.

Description of the Undertaking

This project dismantles the wall on the western perimeter of ANC, constructs a concrete footing and in some areas a partial concrete core. The U.S. Army Corps of Engineers, Norfolk District (NAO) identified areas for wall reconstruction based on the difference in grade between the ANC and JBM-HH sides of the wall (Figure 15).

For all three wall types we will rebuild the wall using Seneca sandstone, blue-grey stone, & coping stones salvaged during dismantling. The mortar composition will be lime-based using sands to create an appropriate color match to the original. The coping will be reset with flashing at the joints as is found in the original wall. The masonry piers will be included in the wall reconstruction.

NAO divided these into three types:

- Type 1 (Figure 16) will be used for areas with a maximum grade difference 1.5 feet or less of soil accumulation. This reconstructs the masonry wall with a concrete footer under the Seneca red sandstone and blue-grey stone portions. The original bluestone coping will be reset with flashing at the coping joints as is found in the original wall. The masonry piers will be included in the wall reconstruction. Type 1 accounts for 5006 feet of wall between the Selfridge/West Gate and the southwest corner of the cemetery (Figure 15), not counting the gates. The ANC Cultural Resource Manager considers this detail type to fall within ANC's streamlined Section 106 review activities under the Programmatic Agreement for Operations, Maintenance, and Repair.
- Type 2 (Figure 17) will be used for areas with a grade difference of 1.5 to 4 feet. This design includes a steel reinforced concrete core which stops even with the highest grade. As with Type 1 the original design will be rebuilt with salvaged stone and mortar. The difference between Type 1 and Type 2 design is a short reinforced concrete stem wall projecting up from the concrete footing. The core wall provides structural strength to retain the soil. The salvaged stone will set on the concrete footer and core wall; no stone will be cut for cladding. All above ground portions of the concrete core will be covered by 6 to 8 inches or thicker salvaged stone. Above the concrete core, the wall will be laid as a tradition masonry wall. This design accounts for 195 feet of wall (Figure 15). The first area is part of the original Seneca sandstone wall (ca. 1879) between the Old Post Chapel Gate at Meigs Drive to the Selfridge Gate at Farragut Drive.
- Type 3 (Figure 18). This will be used in a 264.5 foot section of wall extending from a point opposite Henderson Hall to the southern end of the cemetery (Figure 15). This design type is similar to Type 2. The difference is the height of the reinforced concrete core. Type 3 will be used at areas where the grade between the two sides of the wall is greater than 4 feet. This option uses salvaged stone to reconstruct the top of the wall.

NAO has made arrangements for a team including a qualified historic architect and stone mason to test for mortar composition, and construct a mock up of the Type 1 reconstruction. The

mock-up will be at the point where the reconstructed Seneca sandstone and blue-grey sections meet, so both stone types will be included in the mock-up. Additionally, a previous project using an approach similar to Type 2 rebuilt a 90 foot section of the western ANC Boundary Wall in 2009.

The project as designed is expected to result in surplus Seneca sandstone and blue-grey stone, while salvaged bluestone coping should be equal to the needs of reconstruction. Joints between the stones will have a raised beaded joint as with the original wall, and mortar color and composition formulated to match the appropriate historic mortar.

Excluded from the project are modifications of the Fort Myer (Old Post Chapel) Gate, the Selfridge Gate, or the Memorial Chapel Gate. Headstones will be removed for many of the phases and must be coordinated with ANC. Contractor lay-down and work area is expected to be available on the JBM-HH side of the fence in areas disturbed by previous construction and landscaping.

Ground Disturbance Area of Potential Effects

Excavation for the demolition and reconstruction of the Boundary Wall will focus on the JBM-HH side of the wall. As seen in the detailed project plans (Figures 16-19), these excavations will be mostly within soil deposited as fill or as the result of natural processes since the construction of the wall. This means the soil and any artifacts within date either to the ca. 1879 construction of the original Boundary wall, or the 1897 extension of the wall to the south. Disturbance to soils below the grade of the original wall will be immediately beneath the footer of the original wall, which was subject to ground disturbance at the time the Boundary Wall was constructed. The exception to this is the 264.5 foot section of the Type 3 wall at the southern tip of the cemetery boundary where the concrete footer will be extended at the original grade three to five feet into the JBM-HH side of the wall. A summary of the lengths of the three types of wall reconstruction and associated ground disturbance areas anticipated are given below in Table 1.

Table 1 – Projected Ground Disturbance

Wall Design	**Length (ft).**	**Width (ft.)**	**Acres**
Type 1	5006.01	3	0.3448
Type 2	195	3	0.0134
Type 3	264.53	5	0.0304
Total	5465.54		0.3886
New Ground Disturbance (Type 3)			0.0121

The last two lines relate to the area of ground disturbance to levels at grade at the time the Boundary Wall was constructed 1897. This will be a narrow linear area totaling only .0121 acre.

Other excavation will be into fill accumulated since construction of the Boundary Wall, or into zones probably disturbed during construction.

Archaeological Potential

A map of relative archaeological potential at ANC was created by NAO for ANC in support of the development of their Integrated Cultural Resource Management Plan and Programmatic Agreement for Operations Maintenance and Repair. Potential for archaeological sites is modeled in this document (Haynes 2013, Attachment D in the Programmatic Agreement) for both prehistoric and historic period sites.

The prehistoric predictive model is based on correlates widely observed in the region for site occurrence, including slope, landform, distance to water, and soil permeability. This is accorded a low level of accuracy, due to the generality of these correlates. The Colonial and Antebellum Periods are based on a composite map developed by a National Park Service Historian (Nelligan 1962) and accorded a moderate level of accuracy due to the indirect mapping. The Civil War, a period when the Arlington Estate was the scene of extensive bivouacs during the first year of the war, is mapped based on Plate 6 from the *Atlas to Accompany the Official Records of the Union and Confederate Armies* (U.S. War Department 1895). This was accorded a moderately high level of accuracy due to the relatively large scale of the map. Late 19th modeling is based on the 1888 map of the Arlington Estate created at the time of the foreclosure on the Freedmen's Village and homesteads. It is highly detailed and cartographically accurate, as far as it may be ascertained, and accorded a high level of accuracy as a predictor of archaeological potential. The modeling also included the identification of past soil disturbances, and used 20th century aerial photos to document land use, such as the South Post of Fort Myer, which will have affected the survival of archaeological remains from earlier eras.

A composite map of these factors was created to judge the potential for intact archaeological sites within ANC (Figure 19). The Boundary Wall ground disturbance APE does not fall within any area accorded high archaeological potential in that study. Areas projected as high potential for prehistoric sites are well away from the APE, as are elements associated with the Arlington Estate and Civil War camps. There are two Freedmen's homesteads fairly close to the APE. A small structure belonging to 'J. Chase' was located about 70 feet east of the Boundary Wall, 195 feet south of the road to the Memorial Chapel Gate. Another structure belonging to 'G. Coleman' was located 100 feet east of the wall, about 250 feet south-southwest of the Confederate Memorial. On the JBM-HH side, homesteads of 'C. Hart' and 'W. Butler' were located about 300 feet west-southwest of the Memorial Chapel Gate. None of these are sufficiently close to the APE for outlying artifact scatters to be expected. The burial sections on the ANC side of the APE where the Chase and Coleman homesteads were mapped have been completely filled with graves. Most areas on the JBM-HH side have had some sort of development.

In summary, the ground disturbance APE intersects no known archaeological sites, and is in areas of low to moderate archaeological potential, with some past disturbances. The potential for NRHP eligible archaeological sites in the APE is extremely low.

Determination of Effects

We conclude that the proposed undertaking will have no adverse effects to historic properties. The reconstructed wall will retain the historic appearance of the ANC Boundary Wall, and inappropriate repairs made to the wall in the past will be corrected. The undertaking will not result in an adverse effect to the viewsheds of ANC or the Fort Myer Historic District.

No archaeological resources are known in the ground disturbance APE, and historic documentation and predictive modeling indicate a low moderate potential for archaeological sites, and a very low potential for NRHP eligible sites. Most of the ground disturbance of this project will be in fill and soil accumulated by natural processes since the construction of the wall in 1879 and 1897. Land use of the area since those dates is known, and no archaeological resources of significance can be expected from that period. Because of the past disturbance of wall construction and the limits of ground disturbance unidentified NRHP eligible archaeological resources are unlikely to be present, and no further fieldwork for identification is recommended.

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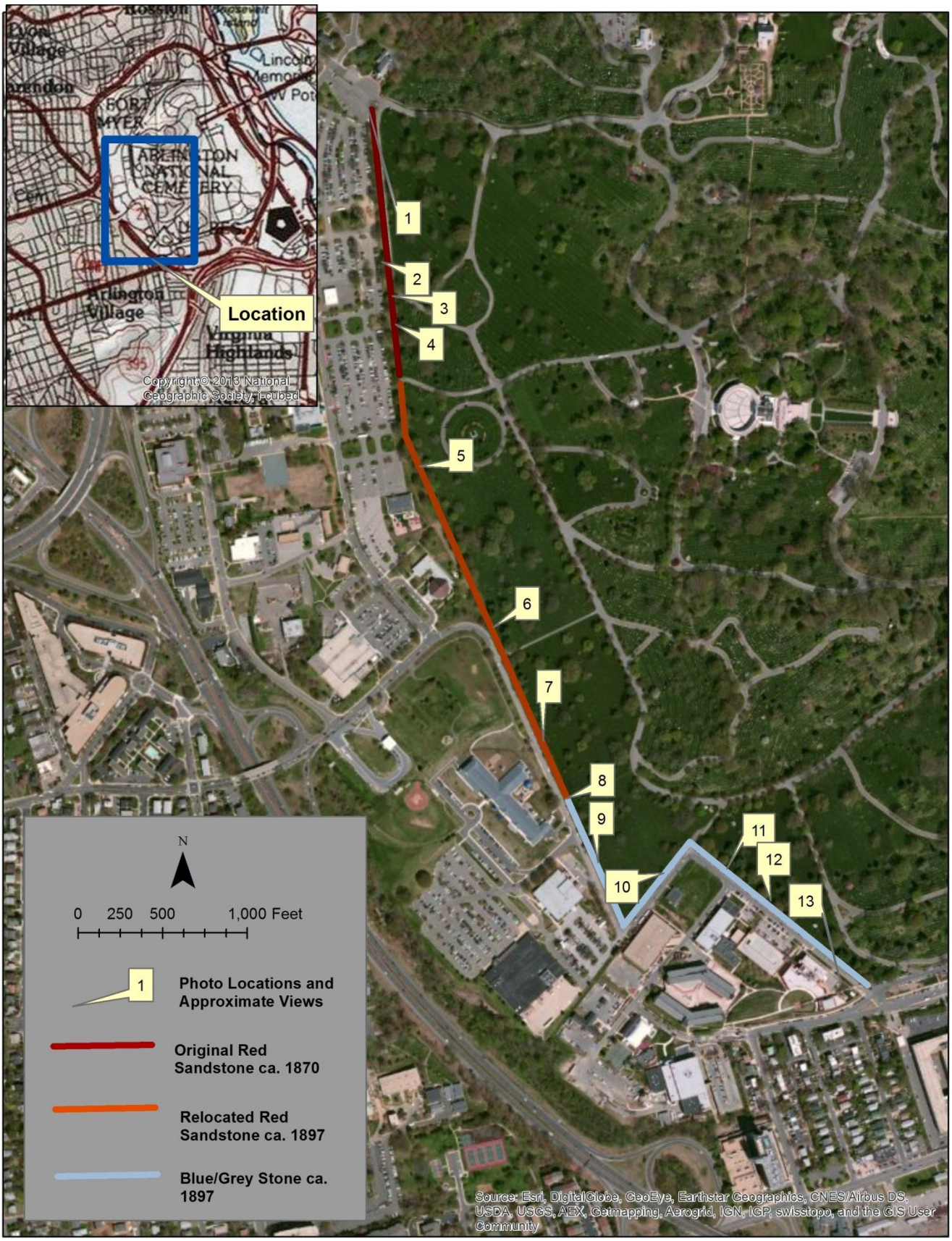

Figure 1 Project Location, Wall Segments, and Photo Locations

Figure 2 - Photo 1

Figure 3 Photo 2

Figure 4 Photo 3 A Collapsed Section of Wall

Figure 5 Photo 4, section of wall reconstructed in 2009

Figure 6 Photo 5, typical of inappropriate repairs made to the walls in the past

Figure 7 Photo 6, a typical section of the relocated sandstone wall

Figure 8 - Photo 7, a “low” section of the wall, where fill has half buried it

Figure 9 Photo 8, end of red sandstone segment, beginning of blue-grey stone segment

Figure 10 - Photo 9, the "Rusted Gate"

Figure 11– Photo 10, Section of the blue-grey stone wall along Hobson Drive, fill and pavement rise to 1.5 feet of the top of the wall on the JBM-HH side.

Figure 12 - Photo 11, mismatched mortar repair and water damage on the blue-grey stone wall

Figure 13- Photo 12, section of wall along Hobson Drive behind Henderson Hall

Figure 14 - Photo 13, section of wall along Hobson Drive at JBM-HH Gate 3. Notice soil surface higher on the JBM-HH side, and low profile of the wall on the cemetery side as well indicating substantial fill accumulation.

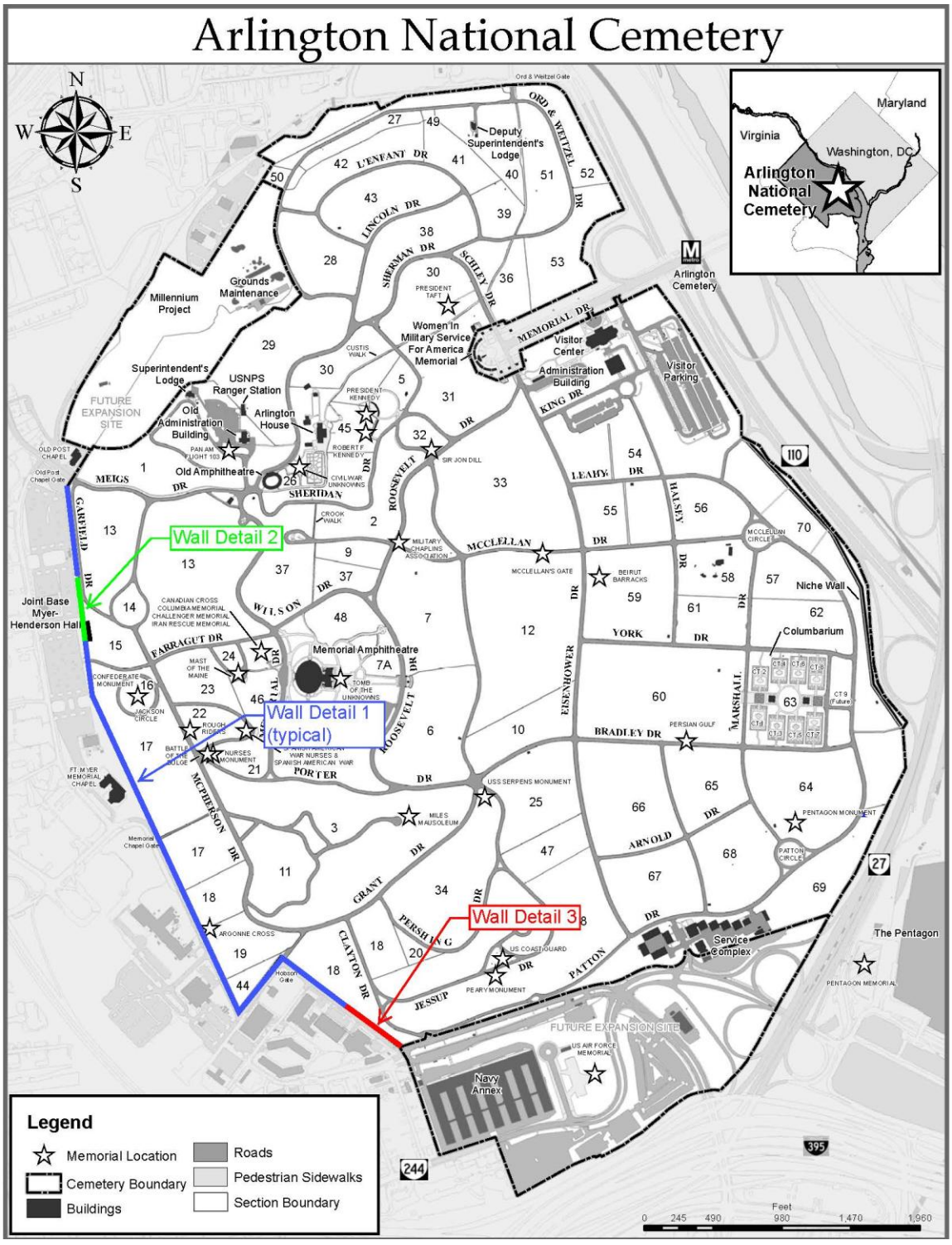

Figure 15 - Areas for Wall Reconstruction Types

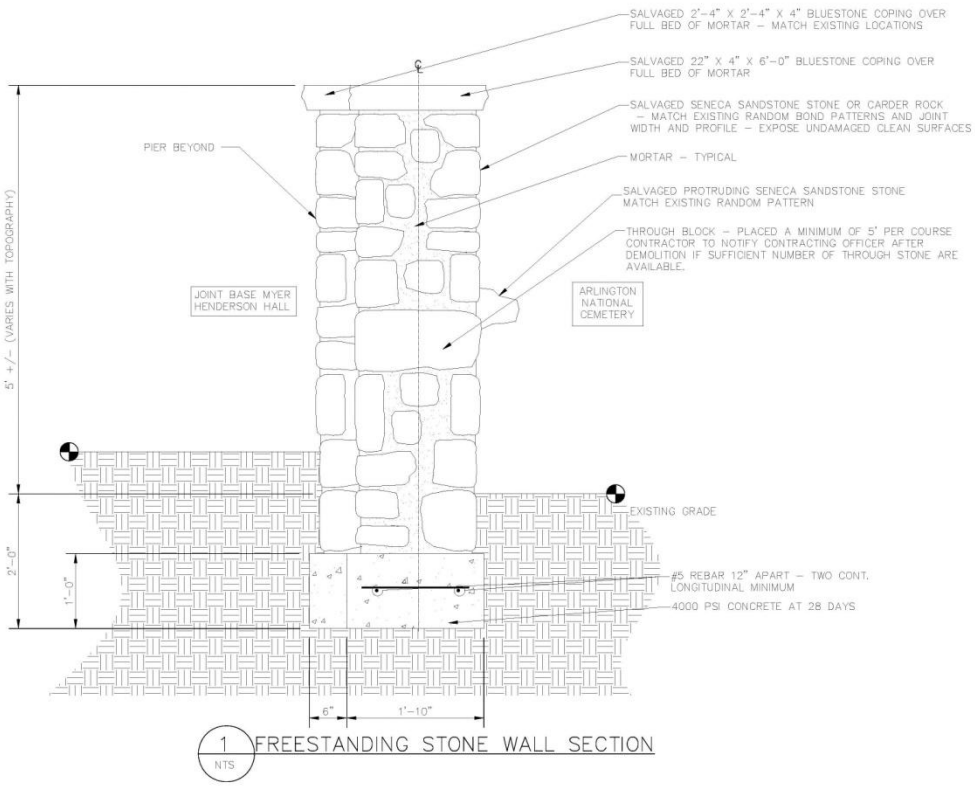

Figure 16 - Wall Reconstruction Type 1

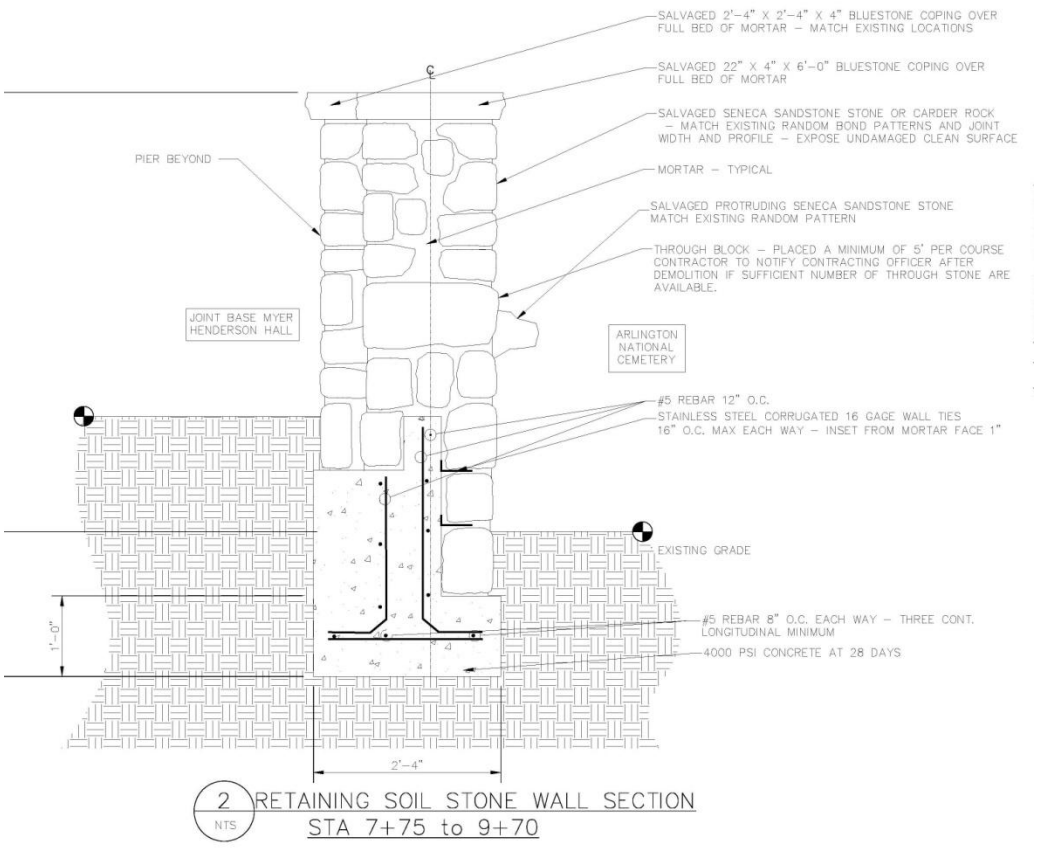

Figure 17 - Wall Reconstruction Type 2

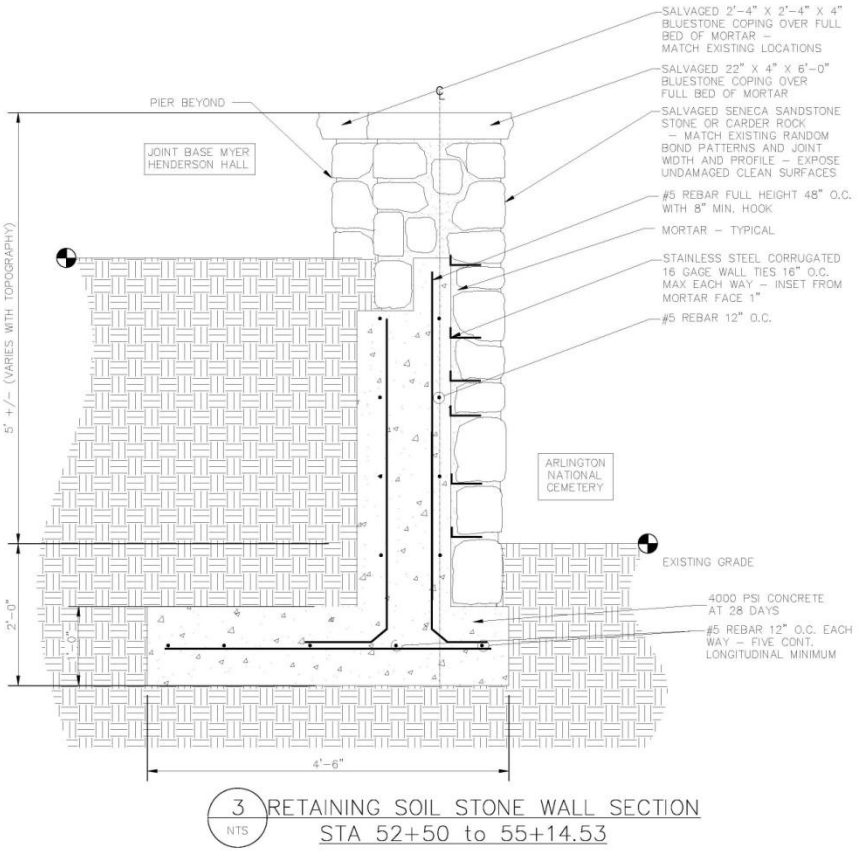

Figure 18 - Wall Reconstruction Type 3

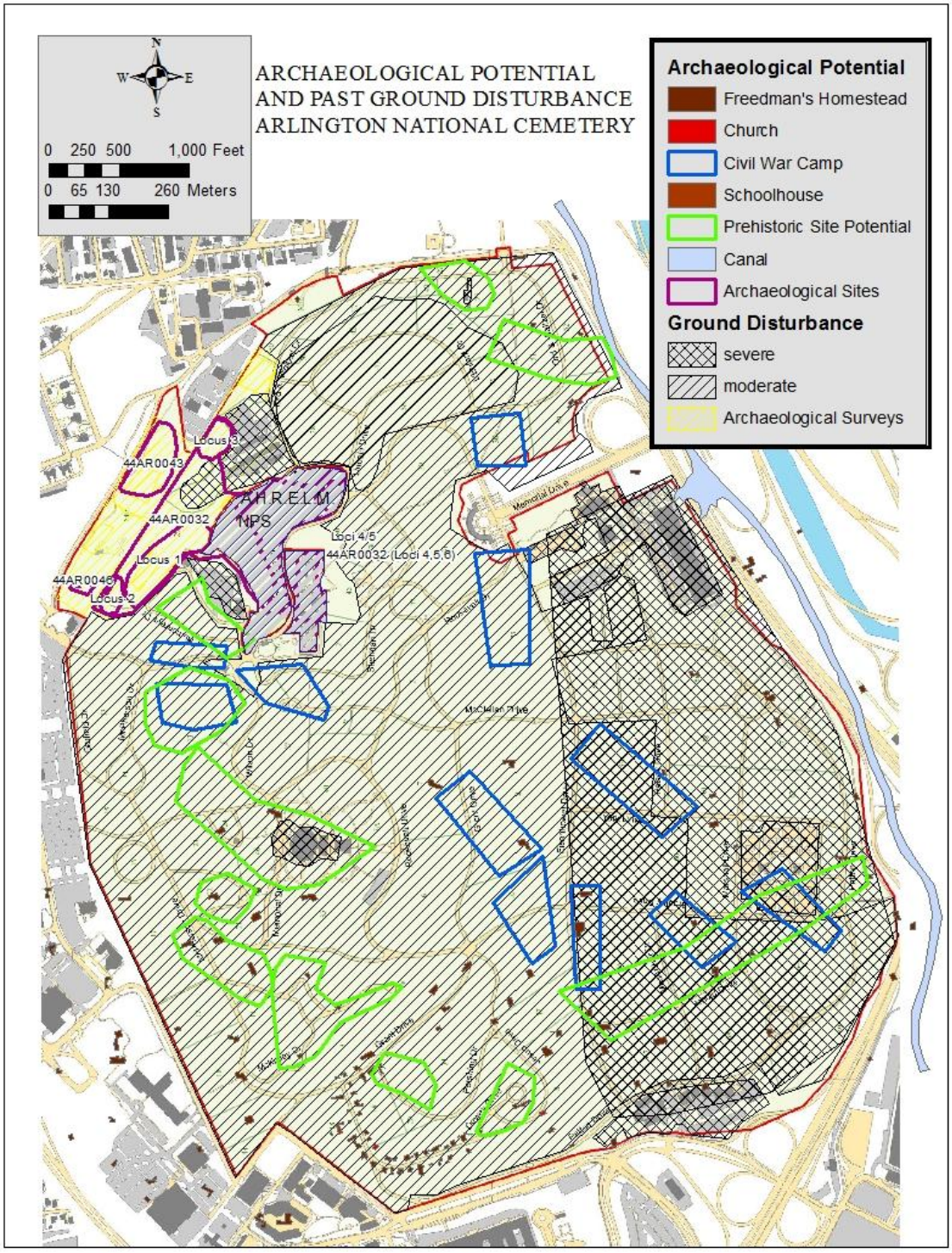

Figure 19- Map of ANC Archaeological Potential (Haynes 2013)