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**JEFFERSON MEMORIAL
NATIONAL MALL & MEMORIAL PARKS
WASHINGTON, DC**

CONTRACT # 1443C2000040800
REPAIR AND CONTROL SETTLEMENT AT JEFFERSON
MEMORIAL SEAWALL, NORTH PLAZA, AND TRANSITION
AREAS
PMIS NO. 128232

FINAL PREDESIGN DOCUMENTS



NATIONAL PARK SERVICE
DENVER SERVICE CENTER
March 6, 2008

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I. PROJECT PROGRAM

The Project Program consists of a Site Program and a Site Analysis. The Site Program discusses each of the structural elements for the project, including the Ashlar Seawall, the North Plaza, Northwest Stairs, and the West Terrace Walk. It provides a description of the various relationships between the structures, their historical significance, and previous and current investigations. This section includes discussions on how the movement of the existing structures affects their functionality. This section also addresses the impact from construction activities related to rehabilitation of these historical structures.

The Site Analysis is a graphic representation of the historically significant areas covered in this study. The site plans highlight various regions that require repair, the influence of the repairs to the site, and historically significant areas. Another site plan shows the various foundation types and points out key elements of the memorial.

A. SITE PROGRAM

1. INTRODUCTION

The Jefferson Memorial is located in the West Potomac Park Historic District and is part of the National Mall & Memorial Parks (NAMA). The structure sits on the southeast shore of the Tidal Basin, at the southern terminus of the Sixteenth Street cross-axis of the Washington Monument Grounds on axis with the White House. The Memorial consists of a dome-like structure reminiscent of the Roman Pantheon and is surrounded by concentric walls and pathways. It was constructed from 1939-1943 and has undergone several changes since then, both cosmetic and structural. The structural changes were necessitated by continual settlement and consolidation of the soft soils present on site. This Project Program identifies the elements around the Memorial that are impacted by soil movements, and addresses their need for stabilization and repair. Figure 1 illustrates the foundation types for the Memorial and its appurtenant structures.

2. AREAS OF STUDY

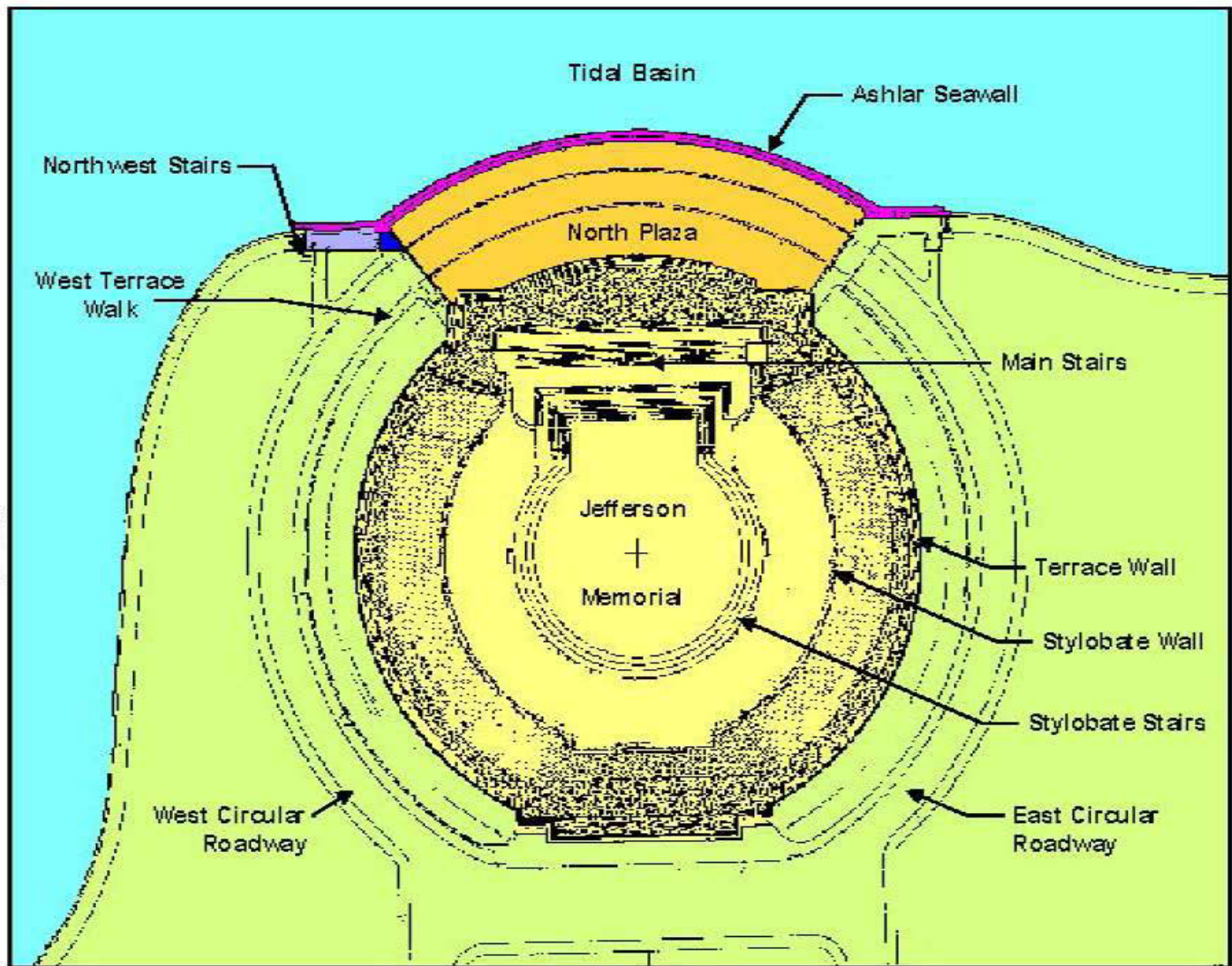
a) Ashlar Seawall







The Ashlar Seawall is the original seawall, which was built in 1941. The granite capstones and the ashlar facing are original materials, and are part of the historic fabric of the Memorial.

The Ashlar Seawall forms the southern boundary of the Tidal Basin and runs along the North Plaza of the Jefferson Memorial. It is a cast-in-place concrete stub wall supported on timber piles and faced with stone, and is approximately 490 feet in length. The arced portion is 378 feet long, and the two horizontal extensions to the east and west of the arc are approximately 56 feet each.

In February 2006, differential movement between the capstone of the Ashlar Seawall and the exposed aggregate concrete paving of the western portion of the North Plaza was observed. Data from "Investigation of Settlement and Upheaval at Jefferson Memorial," prepared by HNTB in 2008 indicates that movement in the seawall has been observed since its construction. This report also indicates that the movement seems to have accelerated since 2005. The magnitude of differential settlement between the Ashlar Seawall and the North Plaza, as indicated in the 2008 HNTB report, suggests that immediate rehabilitation of the Ashlar Seawall is necessary.

The wall is comprised of 10 wall segments separated by joints. At the joints between wall segments, the capstones of the Ashlar Seawall are displaced with respect to each other, indicating relative movement and/or rotation between the seawall segments. Figures 2 and 3 are photos of the Ashlar Seawall and North Plaza interface.



Key	
	Timber Piles 60' to 75' long (1939-1943)
	Raymond piles extending to bedrock (1939-1943)
	Steel piles and grade beams extending to bedrock (1969-1970)
	Foundation unknown, likely piles
	H-Piles, installation date and depth unknown
	On-grade

Reference: Base plan provided by Storch Engineers, 1969

Figure 1. Jefferson Memorial Foundation Types



Figure 2. View Standing on the Ashlar Seawall Looking West (3-29-07)

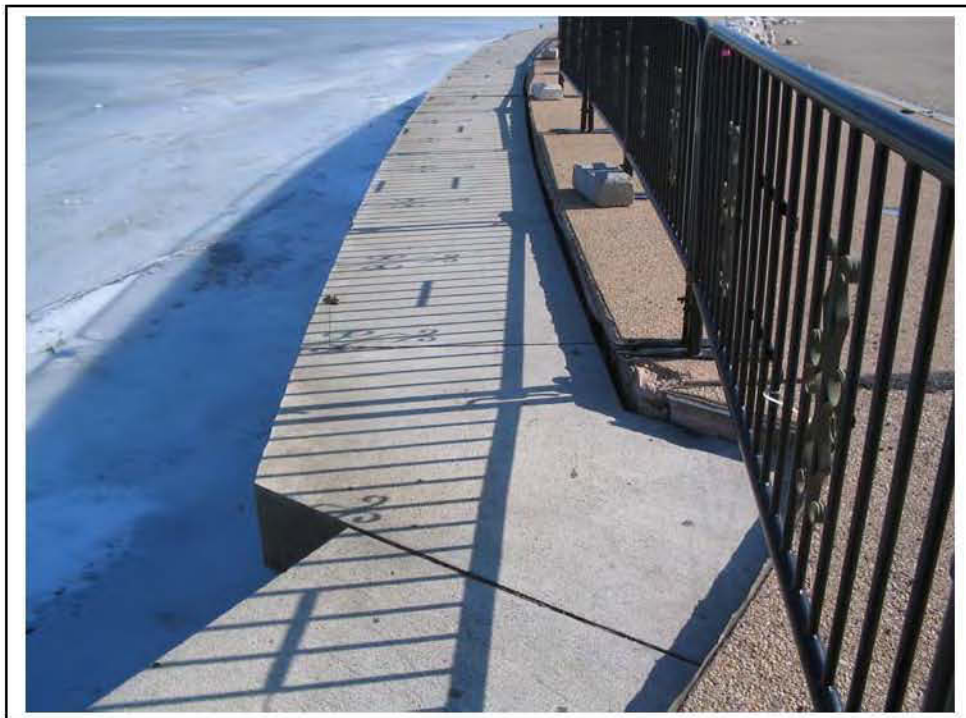


Figure 3. Standing on the North Plaza Looking East at Ashlar Seawall (2-28-07)

b) North Plaza

The North Plaza of the Jefferson Memorial was originally constructed as a slab on grade in 1939-1943, and consisted of an asphalt road bordered by concrete sidewalks. The plaza settled and showed considerable damage in the years immediately following the Memorial's construction. According to "Study and Report for Rehabilitation of Peripheral Approaches and Appurtenant Structures, Jefferson Memorial" by Storch Engineers in 1965, portions of the North Plaza were removed when it began cracking in 1951 and were not repaired until 1969-1970 when the North Plaza was entirely demolished and replaced with a structural slab on a system of piles and grade beams. The intent of this repair was to buttress the North Stairs with steel pipe piles reinforced with H-piles, and reconstruct the North Plaza on H-piles driven to bedrock to prevent additional settlement of the North Plaza slab.

When the plaza was reconstructed in 1969-1970, it was paved with exposed aggregate concrete and regular concrete colored red-brown. Thereafter, vehicles were prohibited from driving around the Memorial (Prothero 2001). In 1999-2000, the entire North Plaza and surrounding roads were restored. The North Plaza was milled to the structural slab, paved with a new exposed aggregate concrete, and the road was made flush with the sidewalks.

Due to settlement that the Circular Roadway had experienced, and according to the Storch documents (1965-1969), a 150-foot long portion of the Circular Roadway adjacent to the west end of the Plaza was filled to meet the Plaza grade. To the east of the Plaza, the backfill wedge over the Circular Roadway was about 20-feet long.

Although the North Plaza has been demolished and rebuilt since its original construction and therefore is not historical itself, the historical lines of the roadway have been preserved. When the North Plaza was last repaved in 1999-2000, the historic character of the original circulation pattern was respected. Granite pavers mark the location of the original concrete curb, and different colors of exposed aggregate concrete are used to distinguish areas that were originally asphalt roadway from those that were originally concrete sidewalk.

Historically, there was no railing or barrier between the North Plaza and the Ashlar Seawall. A barrier is presently in place between the North Plaza and the Ashlar Seawall to prevent the public from accessing the Ashlar Seawall which is displaying settlement with respect to the North Plaza. The barrier can be seen in Figure 4. When the North Plaza was last repaved in 1999-2000, in-slab lighting was used to provide a visual cue or warning as park visitors approached the edge of the North Plaza and the Ashlar Seawall.

Presently, there is differential settlement between the Circular Roadway on grade and the North Plaza structure on piles. This differential settlement is pronounced on the west side, and has necessitated frequent asphalt patching to mitigate tripping hazards. Park maintenance personnel have indicated that these locations require additional patching at the rate of approximately 0.5 inches every three months, and this frequent patching is only a recent necessity (2006-2008). Figures 4 and 5 show the asphalt patches on the western side of the North Plaza.

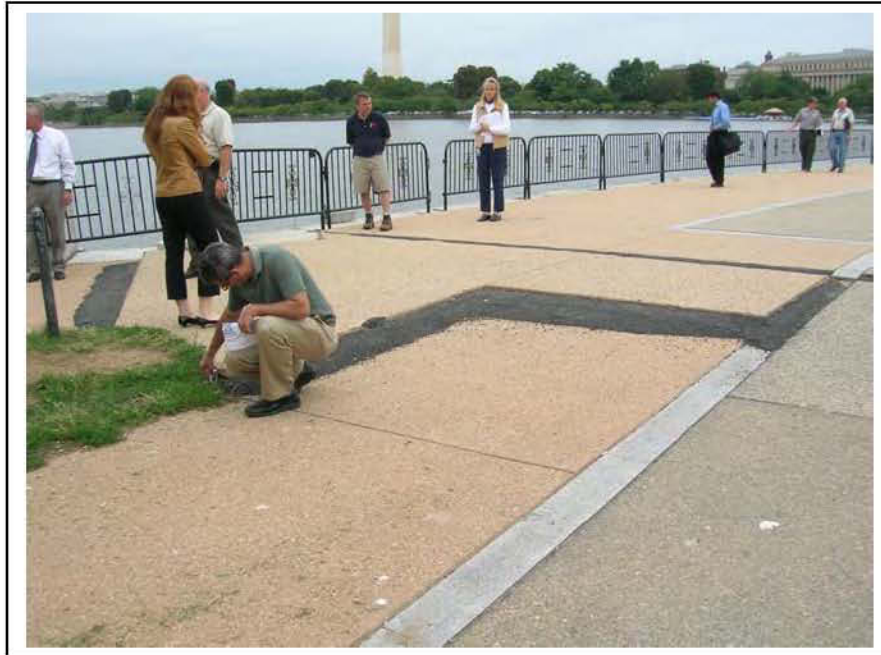


Figure 4. Asphalt Patches on North Plaza and Circular Roadway Interface (9-12-06)



Figure 5. Asphalt Patches on North Plaza and Circular Roadway Interface (10-12-06). Note "bulge" in grassy area suggesting the presence of a grade beam on piles.

The North Plaza has numerous expansion joints running both north-south and east-west. According to the HNTB report from 2008, joint openings between the North Plaza and the Main Stairs appear to be widening in the direction of the Tidal Basin. The opening of the joints represents a tripping hazard for visitors and personnel working at the Jefferson Memorial. The

opening of the joints as well as inclinometer data included in the HNTB 2008 report suggests that the North Plaza structure is moving laterally. Inclinometer data shows that the soil layer approximately ten feet below the western end of the North Plaza is moving laterally in a north-northwest direction at an average rate of about 0.33 inches per year. These vectors of movement are shown in Figure 43 on page 64 of the HNTB 2008 report. Rehabilitation of the North Plaza is needed to control this joint opening at the interface between the plaza and the North Stairs. Failure to address the lateral movement of the North Plaza will eventually result in structural damage to the North Plaza and the Ashlar Seawall. The proposed underpinning of the Ashlar Seawall alone will not prevent further lateral movement of the North Plaza.

c) Northwest Stairs and Walkway

The Northwest Stairs have been repaired since their construction in 1939, and remain part of the Memorial and its appurtenant structures. It is important to repair them to ensure visitor safety and aesthetic appearance. Although the Northwest Stairs and walkway have been demolished and rebuilt at least one time since their original construction, the same general layouts and locations were used. The repairs were necessitated by differential settlement and, at the time of their completion, restored the stairs and walkway to elevations matching the adjacent Memorial features.

The Northwest Stairs are located at the western end of the Ashlar Seawall and to the west of the North Plaza. A concrete walkway connects the Northwest Stairs to the North Plaza. The stairs have a history of settlement and have been jacked and repaired several times. During the Storch (1969-1970) repairs, the stairs were jacked back up to grade using a steel "needle" beam. In 1998, the stairs and sidewalk were demolished and rebuilt with a reinforced slab that appears to bear on the seawall and on five H piles along their south side, parallel with the seawall. The steel piles are shown as existing in the plans for the restoration of the entrance steps and plaza in 1998, but it is not known when they were installed. Today, the stairs and adjacent walkway visibly lean toward the Tidal Basin, possibly due to settlement of the seawall.

A slab-on-grade sidewalk intersects the stairs perpendicularly from the south. At this interface, there are differential elevations resulting in a tripping hazard, which has been mitigated through asphalt patching. Figure 6 shows a photograph of the vicinity.

The concrete walkway extends east from the Northwest Stairs to the North Plaza. This walkway is also supported on the seawall and on a grade beam on piles along its southern edge. The northwest walkway also leans toward the Tidal Basin likely due to settlement of the seawall.

The walkway joins the North Plaza through a roughly triangular-shaped segment of exposed aggregate concrete. The foundation for this triangular wedge is unknown. The HNTB report from 2008 indicates the existence of a significant void underneath this area. It is possible that this triangular wedge is supported on piles or that it is partially bearing on the walkway grade beam and on the North Plaza foundation. The triangular wedge is experiencing settlement, but at a lesser rate than the slab-on-grade Circular Roadway. Figure 7 shows the triangular wedge bounded by asphalt patches.



Figure 6. Asphalt Patch at Northwest Stairs (10-12-06)



Figure 7. Standing on West Approach Walk and Looking at Triangular Wedge (10-12-06)

d) West Terrace Walk

The West Terrace Walk has been repaved since the Memorial's construction, but should retain the same historical location and grading.

Settlement is also occurring on the exposed aggregate concrete sidewalk that leads to the exhibit area on the west side of the Terrace Walk. As shown in Figure 8, there is an asphalt patch in this area to mitigate tripping hazards. The foundation plans for the Jefferson Memorial indicate that the structure is pile-supported from the center of the Memorial to the extent of the Terrace Wall. (Refer to Figure 1, Jefferson Memorial Foundation Types.) Therefore, the West Terrace Walk can be presumed to be pile-supported.



Figure 8. West Terrace Walkway Looking Toward Main Stairs
(10-12-06)

3. FUNCTIONAL REQUIREMENTS AND RELATIONSHIPS

a) Ashlar Seawall

The Ashlar Seawall serves as the northern border for the North Plaza of the Jefferson Memorial. It retains the soil underneath the North Plaza and protects it from erosion from the Tidal Basin waters. The reinforced concrete seawall is approximately ten feet in height and it is supported by a timber pile foundation. It is faced with panels of ashlar stone and capped with a one-foot thick granite capstone. The top of the capstone was intended to be flush with the top of the exposed aggregate paving of the North Plaza. Recent settlement of the seawall has caused the elevation of the capstone to drop with respect to the North Plaza, approximately 6.5 inches on the western end of the arced portion as of December 2007.

The differential elevation between the Ashlar Seawall and the North Plaza has necessitated blocking the area from public access. A temporary fence prevents the public from sitting or standing on the seawall. The barrier affects the aesthetic appearance of the seawall and prevents the visitors from experiencing the Memorial as it was designed.

b) North Plaza

The North Plaza connects the Ashlar Seawall to the north and the Main Stairs to the south, and is bounded by the Circular Roadway on the east and west. Differential settlement is evidenced at the interface between the Circular Roadway and the North Plaza. Park maintenance staff have treated this interface with temporary asphalt patching. In addition, the joint between the North Plaza and the Main Stairs has opened, indicating lateral movement of the North Plaza toward the Tidal Basin.

The North Plaza allows visitors to experience a frontal view of the Memorial and to access the Main Stairs which lead to the interior of the monument. The plaza also affords a view of the Tidal Basin and Washington Monument, as well as other historical vistas. The North Plaza is utilized during the Cherry Blossom festival and other events that take place around the Tidal Basin. Visitors and school groups gather here, and joggers and bikers traverse the plaza regularly. The difference in elevation between the North Plaza and the Circular Roadway has created a serious tripping hazard and access issue for visitors to the Memorial.

c) Northwest Stairs and Walkway

The Northwest Stairs and walkway connect the pathway around the Tidal Basin to the Jefferson Memorial. This area is used by visitors to the Memorial as well as bikers and joggers on the pathway around the Tidal Basin. Settlement between the Northwest Stairs on piles and the walkway on grade has caused a difference in elevation and requires periodic asphalt patching.

d) West Terrace Walk

The West Terrace Walk connects the Main Stairs with the entrance to the exhibit level of the Memorial. This area is regularly used by visitors as a circulation route around the Memorial, and into the bookstore and gift shop areas, and receives a high volume of pedestrian traffic. Settlement has created the need for a temporary asphalt patch on the walkway, and this area should be repaired to allow ease of public access.

4. UNIQUE DESIGN PARAMETERS

This project presents unique design challenges due to the different mechanisms that may be contributing to the movement of the structures. It is also unique because of the interaction between the different structures and how behavior of one structure might affect the behavior of an adjacent structure. Movement of the Ashlar Seawall, the North Plaza and the areas surrounding the Memorial has been recorded since construction, more than 65 years ago. It is important that the design considers the current state of stress of both the structures and the soil.

Information obtained during the "Investigation of Settlement and Upheaval at the Jefferson Memorial" shows that the Ashlar Seawall is experiencing settlement and probable failure of the timber piles supporting it. It is imperative that the seawall be underpinned in order to prevent collapse of the wall. The underpinning of the seawall will not provide for lateral resistance against the movement of the plaza.

This investigation also shows that the North Plaza has experienced significant lateral movement. The condition of the existing pile foundation system is not known; however, based on the current rate of lateral movement observed in the plaza, the pile foundation system is likely under significant stress.

The design is also unique in the sense of the historical value of the structures. The Ashlar Seawall, North Plaza and the walkways are structural elements in the Memorial's cultural

landscape. The seawall is historic. The plaza, walks and Northwest Stairs are not original (historic), but when they were last rehabilitated, the historic character of the original circulation patterns was respected. The design must take into account the preservation of these features.

Data from inclinometers, tiltmeters, piezometers and survey data has been collected for approximately the last 14 months and is included in the HNTB 2008 report. The predesign effort for this project includes quarterly survey monitoring of 22 points on the Ashlar Seawall and North Plaza, and quarterly data collection from the inclinometers, piezometers, tiltmeters, and ground water monitoring wells. This information will be used to verify the mechanisms of soil and structure movement considered in the design.

5. PAST AND CURRENT STUDIES

The Jefferson Memorial is located in West Potomac Park which was a river flat and marsh prior to 1792 (Storch 1965). In accordance with the McMillan plan, when the East and West Potomac parks were created, an area of 327 acres was reclaimed through the dredging of the Washington Channel to establish East Potomac Park. The work was completed in 1927, and by 1932 East Potomac Park was developed as a tourist camp and golf course (Storch 1965). West Potomac Park was created from hydraulic dredging of the swampy regions southwest of the Washington Monument (Heine 1953). It was completely reclaimed and graded by 1908, and by 1922 it was developed and the Lincoln Memorial-Reflecting Pool complex was completed (Storch 1965).

The Jefferson Memorial is founded on a network of deep foundations and grade beams that are arranged radially. The main structure, the Stylobate Wall, and the Terrace Wall are supported by 443 cast-in-place Raymond piles, 88 twenty-four-inch concrete caissons, and 103 sixteen-inch concrete caissons. The surrounding roads and grass areas are on grade. The Ashlar Seawall to the north of the Memorial is supported by vertical and battered timber piles. The North Plaza was initially constructed on grade, but in 1969-1970 it was demolished and reconstructed as a structural slab on grade beams, and steel piles driven to rock.

Throughout the years, several different studies have been undertaken to assess and monitor the settlements taking place on site. They are listed below:

- 1) Settlement Data, Jefferson Memorial 1941-1968
 - a) This data is included in the Storch Report listed below:
 - i) Survey data with vertical and horizontal movements since the construction of the Memorial
- 2) Study and Report for Rehabilitation of Peripheral Approaches and Appurtenant Structures, Jefferson Memorial, Storch Engineers, 1965 and 1968
 - a) These reports include the following:
 - i) Subsurface investigations, geology, and stratigraphy of the site
 - ii) Survey data with vertical and horizontal movements since the construction of the Memorial
 - iii) Laboratory testing and analysis
 - iv) Physical conditions of the structure and adjacent areas
 - v) Proposed solutions for repair of the North Plaza, Main Stairs, Stylobate and Terrace Walls, and surrounding areas
 - vi) Adjustment of corners of Stylobate Wall at entrances to the lower level of Memorial
 - vii) Pile-supported buttress for Stylobate Wall and Terrace Wall to provide lateral support

- viii) Demolition of North Plaza and replacement with structural slab on piles
 - ix) Construction of new tie beams and buttresses beneath Main Stairs
 - x) Removal and resetting of 12 capstones on the west end of the Ashlar Seawall
- 3) Preservation and Restoration of the Jefferson Memorial - Einhorn Yaffee Prescott (EYP) and Hartman-Cox Architects, 1990 and 1992
- a) Contains detailed chronology of the Memorial since June 1934
 - b) Geotechnical inspection as part of this report in 1988 did not reveal signs of settlement of the walls or superstructure
 - c) Report included the following information:
 - i) Review of landscape design and existing conditions of plants
 - ii) Irrigation study
 - iii) Geotechnical study including history of problems and alternative solutions
 - iv) Stylobate Mall drainage and recommendations for sheet piling
 - v) Cost estimate and impact analysis
- 4) Investigation of Settlement and Upheaval at Jefferson Memorial – HNTB, 2008
- a) Contains the following information:
 - i) Review and summary of historical information
 - ii) Site investigation and soil borings
 - iii) Data collected from inclinometers, tiltmeters, piezometers, and ground water observation wells
 - iv) Survey monitoring of the site
 - v) Interpretation of data and three alternative recommendations for repair of the Ashlar Seawall
 - vi) Repair solutions addressing the differential settlements between the North Plaza and the Circular Roadway, and the Northwest Stairs and the adjacent walkway
 - vii) Recommendations for continued collection of instrumentation data and quarterly survey monitoring, and further investigation of the lateral movement of the North Plaza
- 5) Pre-Design and Schematic Design Services for the Jefferson Memorial – HNTB, current
- a) Design alternatives to address the settlement of the Ashlar Seawall and lateral movement of the North Plaza
 - b) Quarterly survey monitoring of 22 points on the Ashlar Seawall and North Plaza
 - c) Quarterly collection of data from inclinometers, piezometers, tiltmeters, and ground water monitoring wells
 - d) Core sampling of the reinforced concrete Ashlar Seawall to assess condition of the concrete and rebar
 - e) Condition assessment of the ashlar stone facing of the seawall
 - f) Prepare Pre-Design and Schematic Design documents

6. REFERENCES

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- Storch Engineers, Study and Report for Rehabilitation of Peripheral Approaches and Appurtenant Structures. 1965.






B. SITE ANALYSIS

The Site Analysis is presented graphically in the following schematics:

1. Areas of Study, Figure 9.
2. Previous and Current Settlement Studies, Figure 10.
3. Impact of Construction Operations, Figure 11.

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TIDAL BASIN

- KEY:**
- AREAS OF STUDY UNDER SCOPE OF SERVICES
 -  DIFFERENTIAL SETTLEMENT AT INTERFACE BETWEEN CIRCULAR ROADWAY ON GRADE AND NORTH PLAZA STRUCTURAL SLAB ON PILES
 -  SETTLEMENT OF ASHLAR SEAWALL
 -  DIFFERENTIAL SETTLEMENT BETWEEN NORTHWEST STAIRS ON PILES AND WALKWAY ON GRADE
 -  DIFFERENTIAL SETTLEMENT AT WEST END OF TERRACE WALL
 -  LATERAL MOVEMENT AS EVIDENCED BY PLAZA JOINT OPENING BETWEEN NORTH PLAZA AND MAIN STAIRS

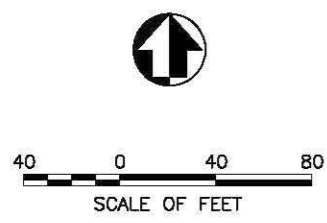
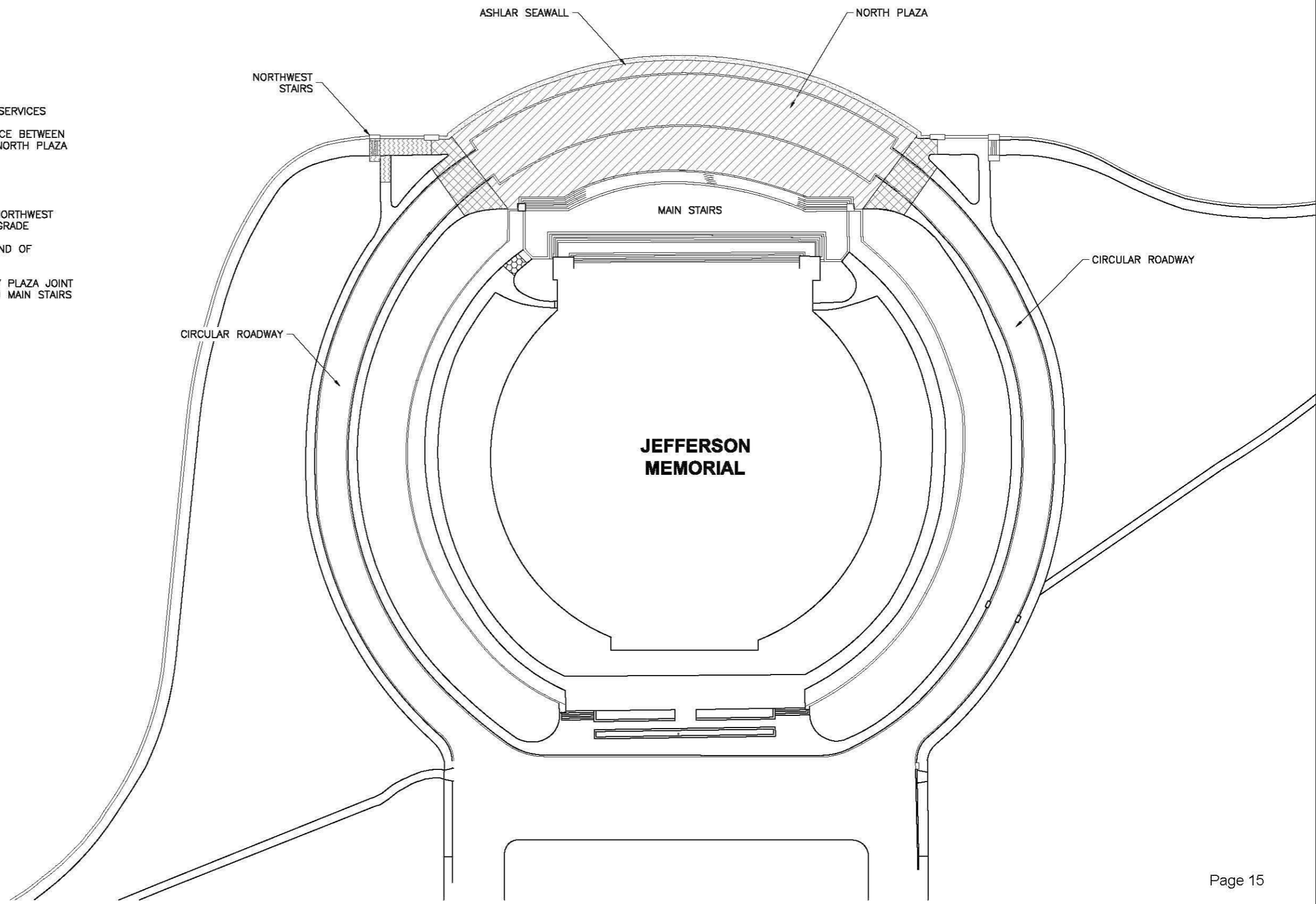


FIGURE 9







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KEY:

PREVIOUS AND CURRENT STUDIES RELATED TO MOVEMENTS OF THE SEAWALL AND NORTH PLAZA

-  **NORTH PLAZA:**
 - 1965 & 1968 STORCH REPORTS AND PLANS FOR RECONSTRUCTING PLAZA
 - 1998 NPS PLANS FOR RESTORATION OF ENTRANCE STEPS AND PLAZA
 - 1999-2000 REPAVING WITH EXPOSED AGGREGATE CONCRETE
 - 2008 HNTB INVESTIGATION OF SETTLEMENT AND UPHEAVAL
-  **MEMORIAL & STYLOBATE MALL:**
 - MONITORING DATA FROM 1941-1968
 - 1965 & 1968 STORCH REPORTS WITH PROPOSED REPAIR SOLUTIONS
 - 1990 & 1992 EINHORN YAFFEE PRESCOTT REPORTS
-  **ASHLAR SEAWALL:**
 - MONITORING DATA FROM 1941-1968
 - 2008 HNTB INVESTIGATION OF SETTLEMENT AND UPHEAVAL
-  **NORTHWEST STAIRS:**
 - 2008 HNTB INVESTIGATION OF SETTLEMENT AND UPHEAVAL
-  **WEST TERRACE WALK:**
 - 2008 HNTB INVESTIGATION OF SETTLEMENT AND UPHEAVAL
-  **CIRCULAR ROADWAY AT INTERFACE WITH NORTH PLAZA:**
 - 2008 HNTB INVESTIGATION OF SETTLEMENT AND UPHEAVAL

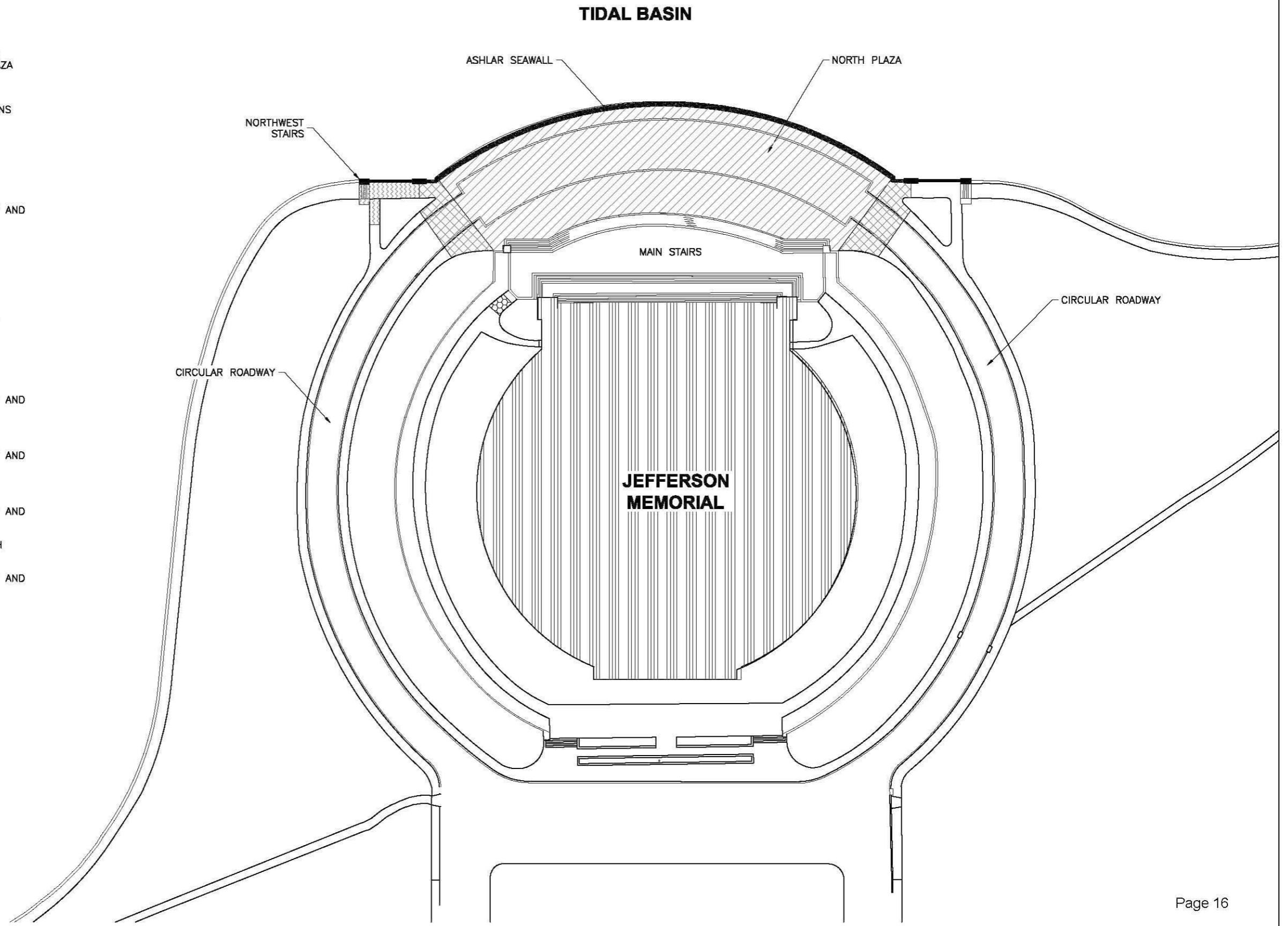
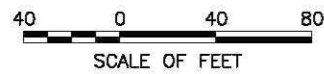


FIGURE 10

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PREVIOUS AND CURRENT SETTLEMENT STUDIES TITLE OF DRAWING						SUB SHEET NUMBER		

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TIDAL BASIN

- KEY:**
 AREAS THAT MAY POTENTIALLY BE AFFECTED BY CONSTRUCTION OPERATIONS
- REHABILITATION OF THE ASHLAR SEAWALL. THIS IS A HISTORIC STRUCTURE
 - REHABILITATION OF THE NORTH PLAZA.
 - REPLACEMENT OF EXISTING SLAB ON GRADE WITH STRUCTURAL SLAB AND INSTALLATION OF FLEXIBLE JOINTS
 - INSTALLATION OF TEMPORARY COFFERDAM AND DEWATERING
 - POSSIBLE CONSTRUCTION STAGING AREA
 - POSSIBLE SITE ACCESS
 - REPLACEMENT OF EXISTING SLAB ON GRADE WITH STRUCTURAL SLAB AND INSTALLATION OF FLEXIBLE JOINTS

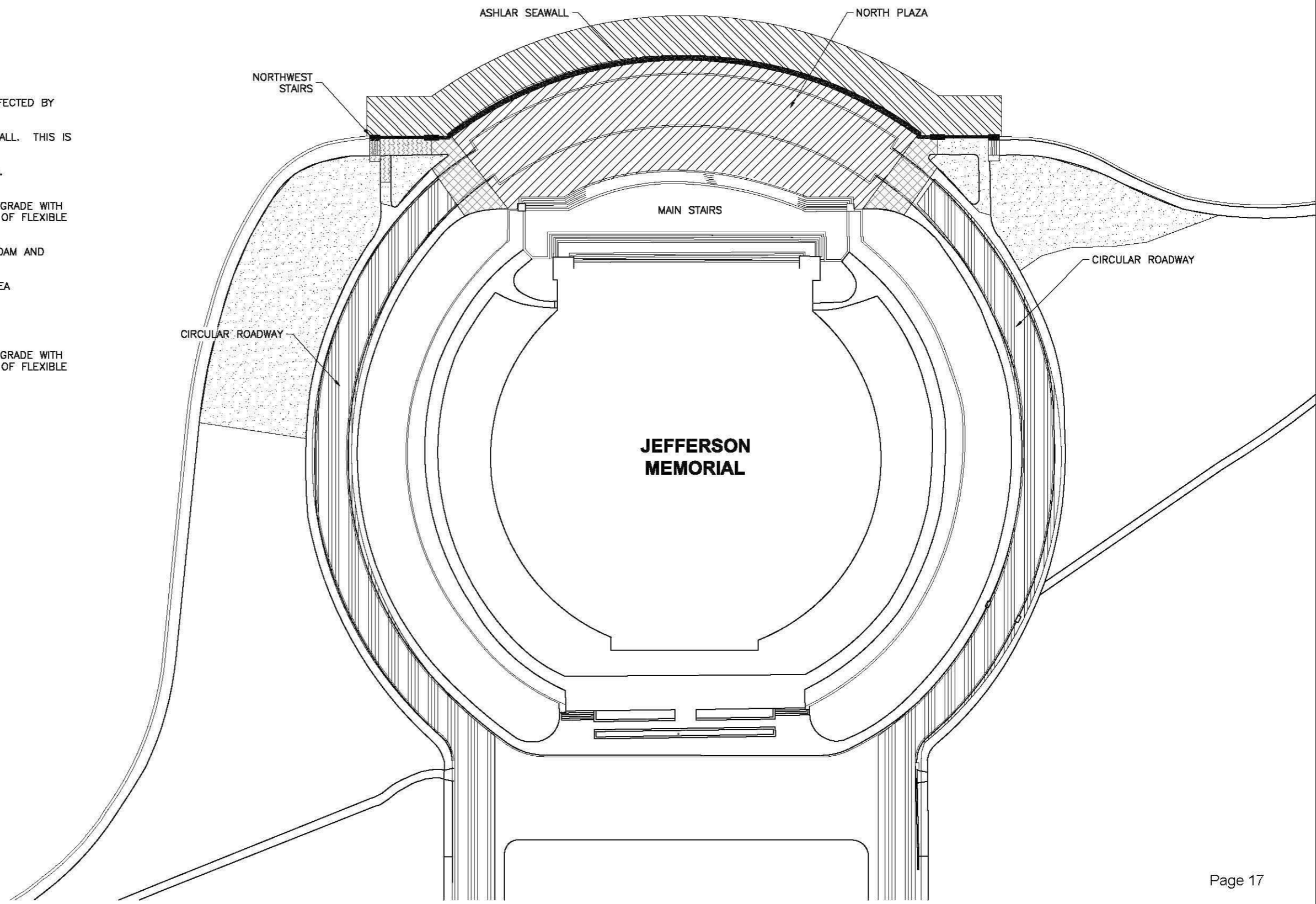
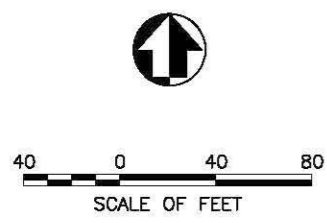


FIGURE 11

REFERENCE: BASE PLAN FOR THIS DRAWING WAS PROVIDED BY DEWBERRY & DAVIS AND GREENHORNE & O'MARA

A/E FIRM HNTB ARCHITECTURE SCHNABEL ENGINEERING	Mark	Sheet	REVISION	Date	Initial		UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION	DW/CJR/HR NSP JG CHECKED
								REPAIR & CONTROL SETTLEMENT TITLE OF PROJECT THOMAS JEFFERSON MEMORIAL LOCATION WITHIN PARK NATIONAL MALL & MEMORIAL PARKS NAME OF PARK
IMPACT OF CONSTRUCTION OPERATIONS TITLE OF DRAWING						SUB SHEET NUMBER		

II. CLASS C COST ESTIMATE

The purpose of the Class C Cost Estimate is to determine the probable cost of the proposed design at Jefferson Memorial. For this cost estimate, the Ashlar Seawall and the North Plaza have been evaluated separately. This estimate considers the probable cost of materials and services in the Washington, DC, area. The Class C estimate is based on a Predesign effort.

A. COST ESTIMATE: SEAWALL

This remediation solution for the Ashlar Seawall consists of installing micropiles to the north and south of the footing of the existing concrete wall. Segments of the North Plaza slab must be removed to excavate behind the seawall. We anticipate removing the plaza slab at the expansion joint located approximately 10 feet behind the seawall. The existing grade beams would remain in place. Battered micropiles could be installed from inside the excavation to the south of the wall footing, and pile cap extensions would be constructed. The micropiles to the north of the footing could be installed from the north plaza elevation; however, a temporary cofferdam would be needed to construct the pile cap extension.

This solution would consist of 53 vertical micropiles in front of the wall, and 53 micropiles battered at five degrees behind the wall. The piles would have an unbonded length of approximately 80 feet, and a bonded length of 10 feet into bedrock. At least one load test on a sacrificial, instrumented micropile should be performed.

Following micropile installation, the wall would be backfilled and the plaza slab replaced. This solution will require removal of the riprap and backfilling after installation of micropiles.

Figure 12 and Figure 13 show schematics for this remediation for the Ashlar Seawall.

The Class C Cost Estimate is included in the pages that follow. A description of the assumptions used in preparation of these cost estimates is also presented.

Class C Construction Cost Estimate

Project: Jefferson Memorial Seawall and Plaza Repair
Park: Thomas Jefferson Memorial
PMIS: 128232

Basis of Estimate

Date of Estimate: 03/05/08

Estimated By: Kirk Associates
1177 Berkshire, Suite 100
Grosse Pointe Park, MI
(248) 240-9605

Supporting Material: Pre-Design Documents / Reports, 01/08

Cost Data: Square Foot Cost Data.
Unit Prices based on 2008 Cost data
Conversations with Consulting Engineers

Mark-ups and Add-ons: **Published Location Factor:** RS Means (Washington, D.C.).
Project Remoteness: Site is in downtown Washington D.C. (dense urban)
Federal Wage Rate Factor: 6 Percent Guidance from NPS.
Design Contingency: Limited Detail on Pre-Design Report, however this is a small project. 25 percent seems appropriate.
Taxes: 4.75 Percent Sales Tax included in Unit Costs
Standard General Conditions: Above Normal Range of 18 Percent due to special equipment needs.
Government General Conditions: 10 Percent within NPS Guidance Recommendations.
Bonds and Permits: 1.5 percent bond included in General Conditions. No permit costs.
Historic Preservation Factor: Memorial cost include 5% Historic Factor.
Overhead: Small Job, Limited sub-contractors due to work in region.
Profit: 10 Percent
Contracting Method Adjustment: No indication of what the construction contract will be, assume it require 25% premium (may be lower).
Inflation Escalation: Assume midpoint of construction to begin July, 2009 with 18 month construction period. Inflation predictions indicate 6% per year.

Comments: Most Work assumed to be completed by land based equipment
Installation of water side cofferdam would be completed by water based equipment
Park operations will be open in this area during the repair work
Removed materials will be kept on site before re-installation

Seawall Alternative 3: This alternative consists of installing micropiles battered at 0 degrees in front of the wall, and 5 degrees behind the wall. This would required using a temporary cofferdam to allow for the construction of the pile cap extension. The piles would have an unbonded length of approximately 80 feet and a bonded length of 10 feet.

Class C Construction Cost Estimate

Project: Jefferson Memorial Seawall and Plaza Repair
 Park: Thomas Jefferson Memorial
 PMIS: 128232

Estimate By: S. Garrett
 Date: 03/05/08

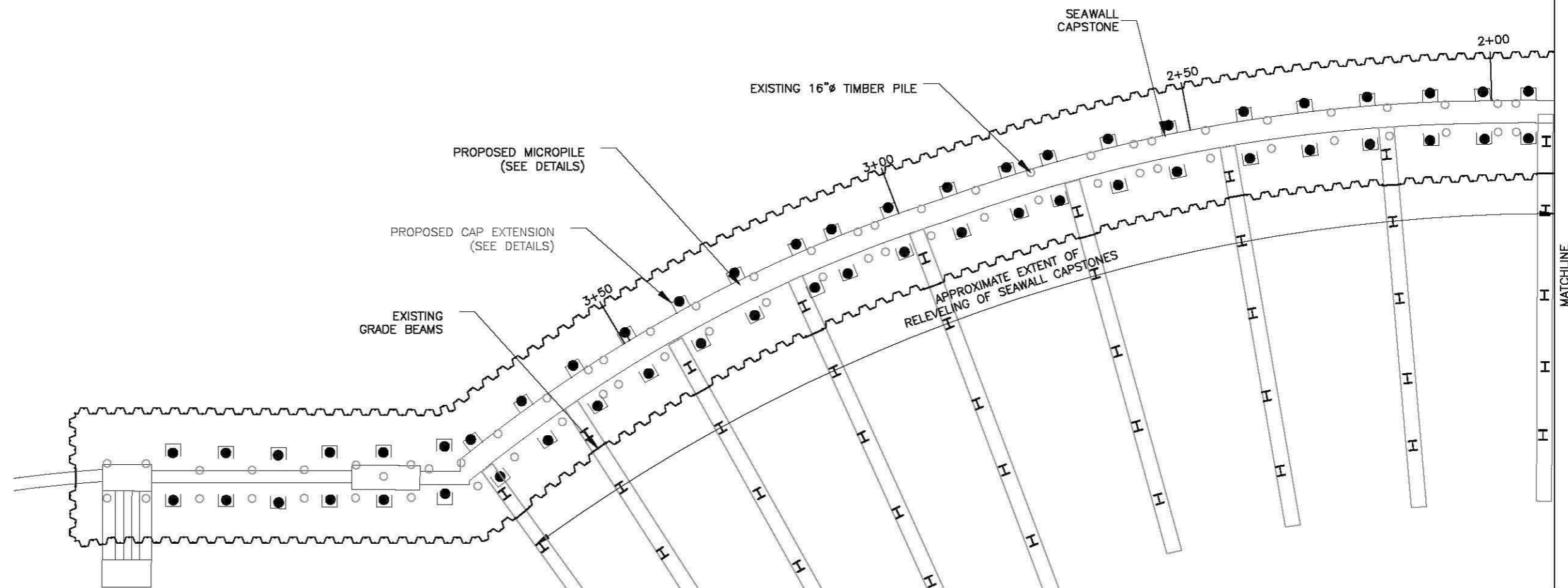
Seawall Alternative 3:

Reviewed By: R. Merrick
 Date: 02/26/08

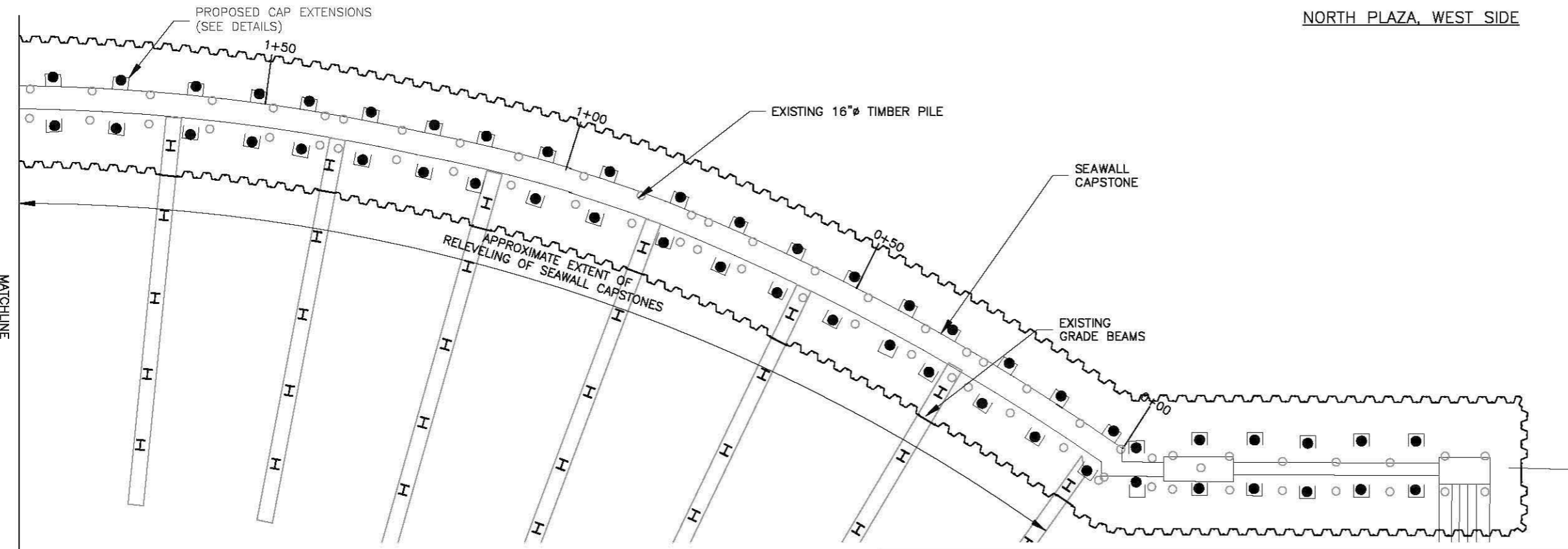
Estimate is based on 2008 costs

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Complete pre-work condition survey	1	LS	\$10,000.00	\$10,000
2	Install vibration monitoring equipment	1	LS	\$3,500.00	\$3,500
3	Remove North Plaza Slab (to expansion joint at 10'-0")	5,000	SF	\$10.00	\$50,000
4	Remove Capstone (store on site)	500	LF	\$150.00	\$75,000
5	Install temporary cofferdam-land side (sheet pile)	4,000	Wall SF	\$24.00	\$96,000
6	Install temporary cofferdam-water side (sheet pile)	6,000	Wall SF	\$38.00	\$228,000
7	Excavate to rip rap	2,222	CY	\$20.00	\$44,444
8	Excavate of 5' of rip rap	926	CY	\$30.00	\$27,778
9	Install temporary grade beam supports	1	LS	\$12,500.00	\$12,500
10	Core micropiles	107	EA	\$825.00	\$88,275
11	Install sacrificial micropile	1	EA	\$12,500.00	\$12,500
12	Conduct load test	1	LS	\$7,500.00	\$7,500
13	Install battered micropiles (90' length)	106	EA	\$12,500.00	\$1,325,000
14	Install cap extensions	106	EA	\$1,280.00	\$135,680
15	Install new engineered fill	2,222	CY	\$35.00	\$77,778
16	Install rip-rap	926	CY	\$55.00	\$50,926
17	Install New North Plaza structural slab	5,000	SF	\$35.00	\$175,000
18	Install 3" exposed aggregate concrete topping slab	5,000	SF	\$13.50	\$67,500
19	Reinstall / Minor Repair Capstone	500	LF	\$300.00	\$150,000
20	Repair site damage from construction	1	Allowance	\$5,000.00	\$5,000
21	Complete post-work condition survey	1	LS	\$12,000.00	\$12,000
	Subtotal Direct Construction Costs				2,654,381
	Published Location Factor	3.0%			79,631
	Remoteness Factor (urban)	0.0%			0
	Federal Wage Rate Factor	6.0%			79,631
	Design Contingency	25.0%			663,595
	Total Direct Construction Costs				3,477,239
	Standard General Conditions	30.0%			1,043,172
	Government General Conditions	10.0%			347,724
	Historic Preservation Factor (Memorial)	5.0%			173,862
	Subtotal NET Construction Cost				5,041,997
	Overhead	12.5%			630,250
	Profit	10.0%			504,200
	Estimated NET Construction Cost				6,176,446
	Contracting Method Adjustment (Full Open)	5.0%			308,822
	Inflation Escalation (6.0% / Yr; 27 Months)	13.5%			833,820
	Total Estimated NET Cost of Construction				7,319,100

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NORTH PLAZA, WEST SIDE



NORTH PLAZA, EAST SIDE



LEGEND

- EXISTING 16" Ø TIMBER PILE
- PROPOSED MICROPILE

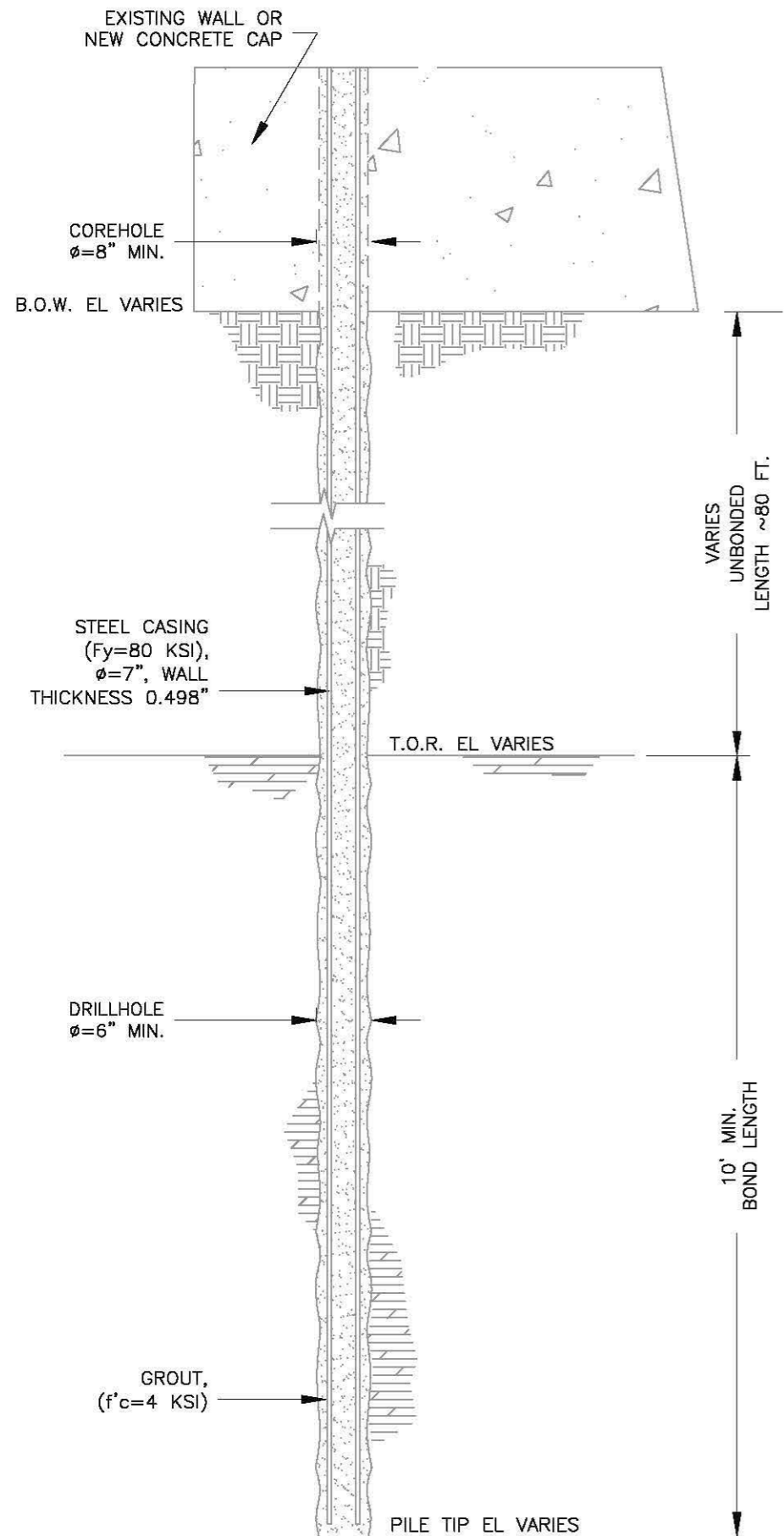


NOTE:
GEOMETRY BASED ON
HISTORICAL DOCUMENTS AND
MUST BE VERIFIED IN FIELD.

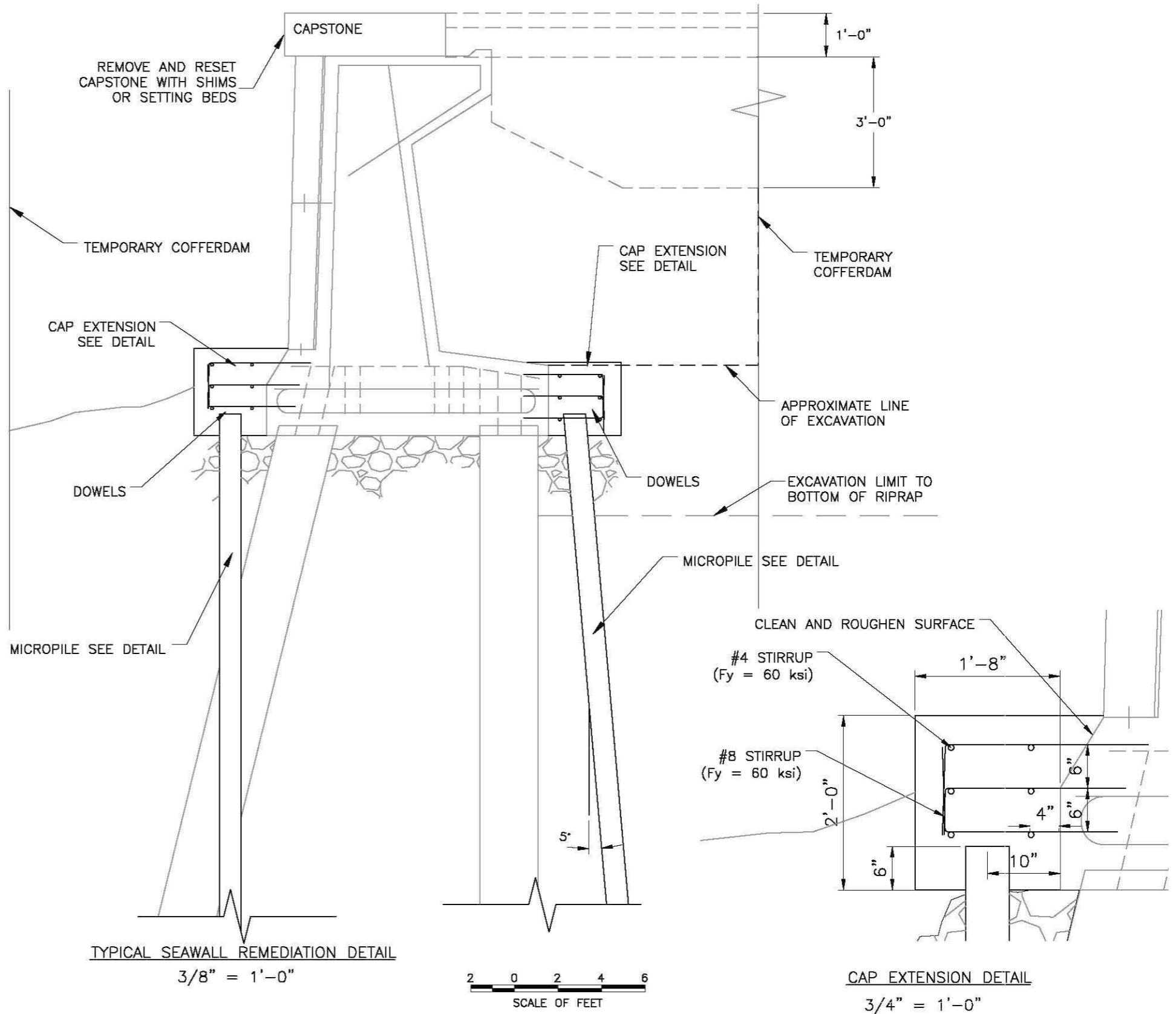
FIGURE 12

A/E FIRM HNTB ARCHITECTURE SCHNABEL ENGINEERING	Mark	Sheet	REVISION	Date	Initial
REMEDIATION OF ASHLAR SEAWALL <small>TITLE OF DRAWING</small>					
SUB SHEET NUMBER					
UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION					DW/CJR/HR NSP/SCB JG JG
REPAIR & CONTROL SETTLEMENT TITLE OF PROJECT THOMAS JEFFERSON MEMORIAL LOCATION WITHIN PARK NATIONAL MALL & MEMORIAL PARKS NAME OF PARK					128232 DATE 3/6/08 DWG. NO. 808/80284

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TYPICAL MICROPILE TYPE I DETAIL
NO SCALE



TYPICAL SEAWALL REMEDIATION DETAIL
3/8" = 1'-0"

CAP EXTENSION DETAIL
3/4" = 1'-0"

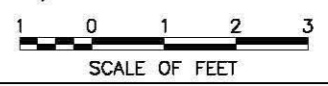
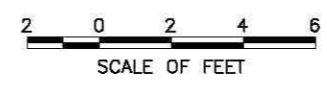


FIGURE 13

A/E FIRM	Mark	Sheet	REVISION	Date	Initial
	HNTB ARCHITECTURE				
SCHNABEL ENGINEERING					

REMEDATION OF ASHLAR SEAWALL - SECTIONS
TITLE OF DRAWING

UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION	DW/GJR/HR NSJ/SCB JG CHECKED
REPAIR & CONTROL SETTLEMENT TITLE OF PROJECT THOMAS JEFFERSON MEMORIAL LOCATION WITHIN PARK NATIONAL MALL & MEMORIAL PARKS NAME OF PARK	128232 DATE 3/6/08 808/80284

B. COST ESTIMATE: NORTH PLAZA

1. NORTH PLAZA STRUCTURE

This rehabilitation solution consists of retrofitting the North Plaza structure with new piles and a new structural slab to resist lateral movements. It requires removing the existing structural slab at the North Plaza, and installing pipe piles to bedrock. The existing piles and pile caps would remain in place. This solution addresses the condition of the existing piles, and supplements their load capacity with additional piles.

This would consist of approximately forty-five 18"-diameter steel pipe piles battered at 30° toward the Ashlar Seawall, and ninety 18"-diameter steel pipe piles installed vertically. The vertical piles would have a length of approximately 90 feet, and the battered piles would have a length of approximately 105 feet. All piles are to be driven to top of bedrock, which is approximately located at EL -86.6 feet. At least three load tests on sacrificial, instrumented pipe piles should be performed. The layout of the pipe piles would consist of 15 radial sections containing three battered piles, and six vertical piles in each section. Six continuous arced grade beams would span across all of the sections, and dowel into the existing grade beams where they intersect.

All sections of the north plaza structural slab will be removed and demolished. The pipe piles will be driven into bedrock and the arced grade beams will be formed and poured. Stay-in-place formwork will be used to span the gaps between the radial and arced grade beams, and a new structural slab of approximately 20,800 feet² will be constructed.

Figures 14 through 17 show schematics of this remediation for the North Plaza.

2. DIFFERENTIAL SETTLEMENT AT EAST AND WEST ENDS

At the North Plaza, there is noticeable relative movement at the interface between the structural slab-on-piles and the adjacent Circular Road slab-on-grade. The elevation difference, resulting from settlement of the slab-on-grade, is a tripping hazard and requires frequent asphalt patching. Our proposed remediation method consists of cutting at the edge of the structural slab, removing 10 feet of the Circular Roadway slab at both ends of the North Plaza, and replacing with a 10-foot wide structural transition slab. Micropiles would be installed at five feet on center adjacent to the eastern and western-most grade beams on the North Plaza, and would be capped with a grade beam. This beam would support the one edge of a new structural slab. A new footing would support the other edge of the slabs, and at either end a flexible joint would be used to allow the slab to undergo anticipated settlements without causing tripping hazards.

Figure 18 and Figure 19 show schematics for this remediation.

3. DIFFERENTIAL SETTLEMENT ALONG NORTHWEST STAIRS

The Northwest Stairs that approach the North Plaza along the Ashlar Seawall are supported on their north side by the seawall, and on their south side by H piles and a grade beam. To the south of the stairs, a slab-on-grade sidewalk intersects perpendicularly. At this interface between the sidewalks on piles and on grade, there are differential elevations resulting in a tripping hazard and the need for an asphalt patch. Our proposed remediation method consists of removing 10 feet of the sidewalk slab, and creating a joint at the base of the existing grade beam. A new structural slab would be constructed and supported on the existing beam to the north, and a new footing at the south edge. The interface would be sealed with a flexible joint to allow the sidewalk to undergo anticipated settlements.

Figure 20 shows schematics for this remediation.

NORTH PLAZA STRUCTURE

Class C Construction Cost Estimate

Project: Jefferson Memorial Seawall and Plaza Repair

Park: Thomas Jefferson Memorial

PMIS: 128232

Basis of Estimate

Date of Estimate: 03/05/08

Estimated By: Kirk Associates
1177 Berkshire, Suite 100
Grosse Pointe Park, MI
(248) 240-9605

Supporting Material: Pre-Design Documents / Reports, 01/08

Cost Data: Square Foot Cost Data.
Unit Prices based on 2008 Cost data
Conversations with Consulting Engineers

Mark-ups and Add-ons: **Published Location Factor:** RS Means (Washington, D.C.).
Project Remoteness: Site is in downtown Washington D.C. (dense urban)
Federal Wage Rate Factor: 6 Percent Guidance from NPS.
Design Contingency: Limited Detail on Pre-Design Report, however this is a small project. 25 percent seems appropriate.
Taxes: 4.75 Percent Sales Tax included in Unit Costs
Standard General Conditions: Above Normal Range of 18 Percent due to special equipment needs.
Government General Conditions: 10 Percent within NPS Guidance Recommendations.
Bonds and Permits: 1.5 percent bond included in General Conditions. No permit costs.
Historic Preservation Factor: Memorial cost include 5% Historic Factor.
Overhead: Small Job, Limited sub-contractors due to work in region.
Profit: 10 Percent
Contracting Method Adjustment: No indication of what the construction contract will be, assume it require 25% premium (may be lower).
Inflation Escalation: Assume midpoint of construction to begin July, 2009 with 18 month construction period. Inflation predictions indicate 6% per year.

Comments: Work assumed to be completed by land based equipment
Park operations will be open in this area during the repair work
Removed materials will be kept on site before re-installation

North Plaza
Alternative 1: This alternative consists of retrofitting the North Plaza structure with new piles and a new structural slab to resist lateral movements. It requires removing the existing structural slab at the North Plaza, and installing vertical and battered HP piles to bedrock. The existing piles and pile caps would remain in place. A series of 6 arched grade beams will be installed to reinforce the new structural slab.

Class C Construction Cost Estimate

Project: Jefferson Memorial Seawall and Plaza Repair
 Park: Thomas Jefferson Memorial
 PMIS: 128232

Estimate By: S. Garrett
 Date: 03/05/08

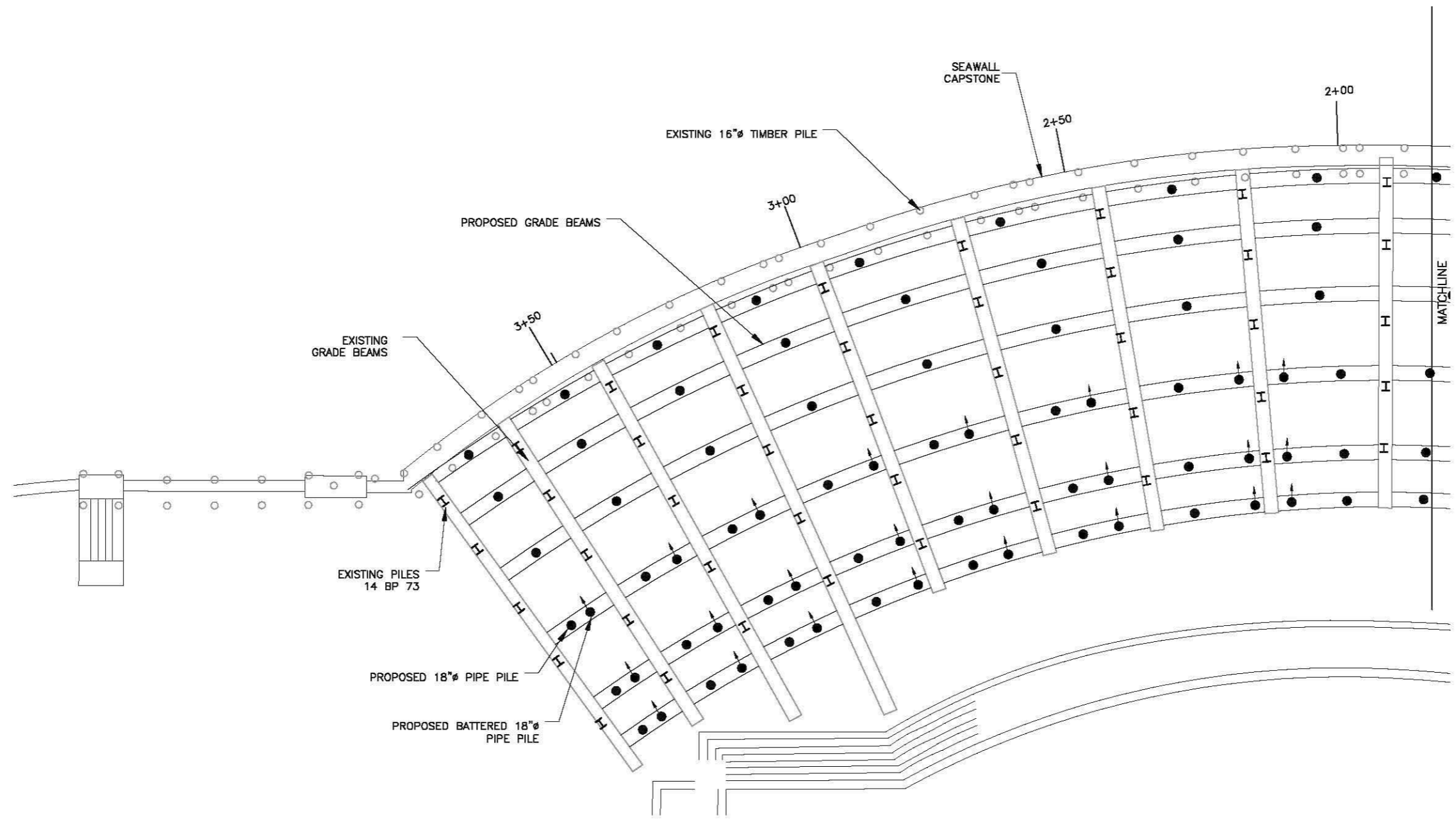
North Plaza Alternative 1:

Reviewed By: R. Merrick
 Date: 02/26/08

Estimate is based on 2008 costs

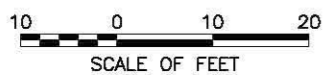
Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Complete pre-work condition survey	1	LS	\$10,000.00	\$10,000
2	Install vibration monitoring equipment	1	LS	\$3,500.00	\$3,500
3	Remove North Plaza Slab (in sections)	20,800	SF	\$7.50	\$156,000
4	Remove and store North Plaza Granite features	2,091	SF	\$3.00	\$6,272
5	Excavate under slab for grade beam placement	1,156	CY	\$15.00	\$17,333
6	Install leave in place forms for 6 grade beams / section	15	Sections	\$1,800.00	\$27,000
7	Install temporary bracing	15	Sections	\$700.00	\$10,500
8	Install sacrificial HP pile	2	EA	\$17,500.00	\$35,000
9	Conduct load test	2	LS	\$7,500.00	\$15,000
10	Install battered HP piles (105' length)	45	EA	\$17,500.00	\$787,500
11	Install vertical HP piles (90' length)	90	EA	\$16,500.00	\$1,485,000
12	Install arched 6 continuous grade beams	587	CY	\$425.00	\$249,333
13	Install New North Plaza structural slab	20,800	SF	\$35.00	\$728,000
14	Install 3" exposed aggregate concrete topping slab	20,800	SF	\$13.50	\$280,800
15	Reinstall North Plaza Granite Features	2,091	SF	\$8.00	\$16,725
16	Repair site damage from construction	1	Allowance	\$2,500.00	\$2,500
17	Complete post-work condition survey	1	LS	\$12,000.00	\$12,000
	Subtotal Direct Construction Costs				3,842,464
	Published Location Factor	3.0%			115,274
	Remoteness Factor (urban)	0.0%			0
	Federal Wage Rate Factor	6.0%			115,274
	Design Contingency	25.0%			960,616
	Total Direct Construction Costs				5,033,628
	Standard General Conditions	30.0%			1,510,088
	Government General Conditions	10.0%			503,363
	Historic Preservation Factor (Memorial)	5.0%			251,681
	Subtotal NET Construction Cost				7,298,760
	Overhead	12.5%			912,345
	Profit	10.0%			729,876
	Estimated NET Construction Cost				8,940,981
	Contracting Method Adjustment (Full Open)	5.0%			447,049
	Inflation Escalation (6.0% / Yr; 27 Months)	13.5%			1,207,032
	Total Estimated NET Cost of Construction				10,595,100

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REMEDATION OF NORTH PLAZA - WEST SIDE
SCALE 1" = 10'-0"

- LEGEND**
- PROPOSED 18"Ø PIPE PILE
 - ⬆ PROPOSED BATTERED 18"Ø PIPE PILE
 - I EXISTING PILES 14 BP 73
 - EXISTING 16"Ø TIMBER PILE

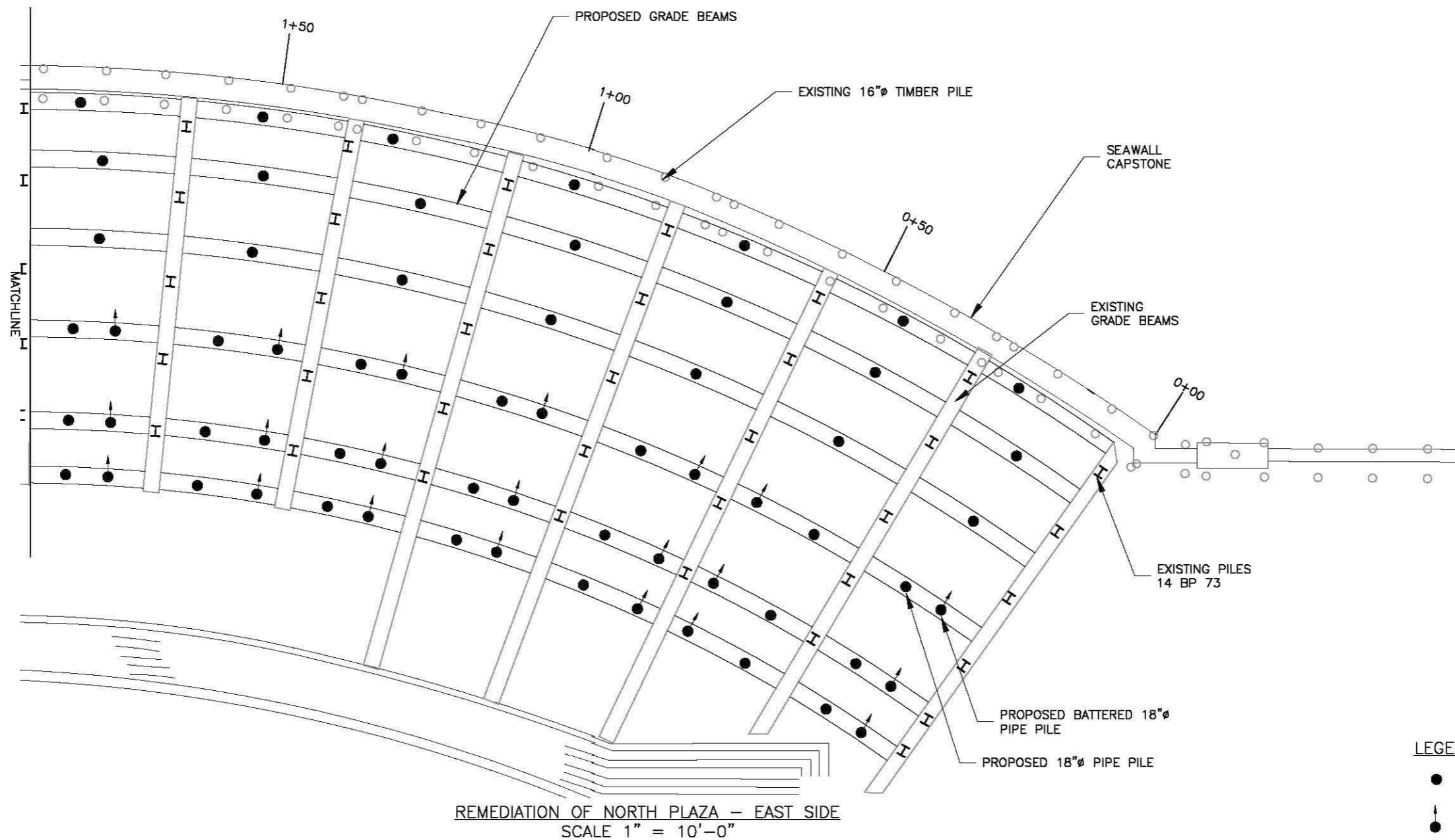


NOTE:
GEOMETRY BASED ON
HISTORICAL DOCUMENTS AND
MUST BE VERIFIED IN FIELD.

FIGURE 14

A/E FIRM HNTB ARCHITECTURE SCHNABEL ENGINEERING	Mark	Sheet	REVISION	Date	Initial	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION	DW/CJR/HR NSP/SCB
	REMEDATION OF NORTH PLAZA - WEST SIDE						
SUB SHEET NUMBER							128232 3/6/08 808/80284

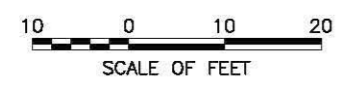
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REMEDATION OF NORTH PLAZA - EAST SIDE
SCALE 1" = 10'-0"

- LEGEND**
- PROPOSED 18"Ø PIPE PILE
 - ↑ PROPOSED BATTERED 18"Ø PIPE PILE
 - I EXISTING PILES 14 BP 73
 - EXISTING 16"Ø TIMBER PILE

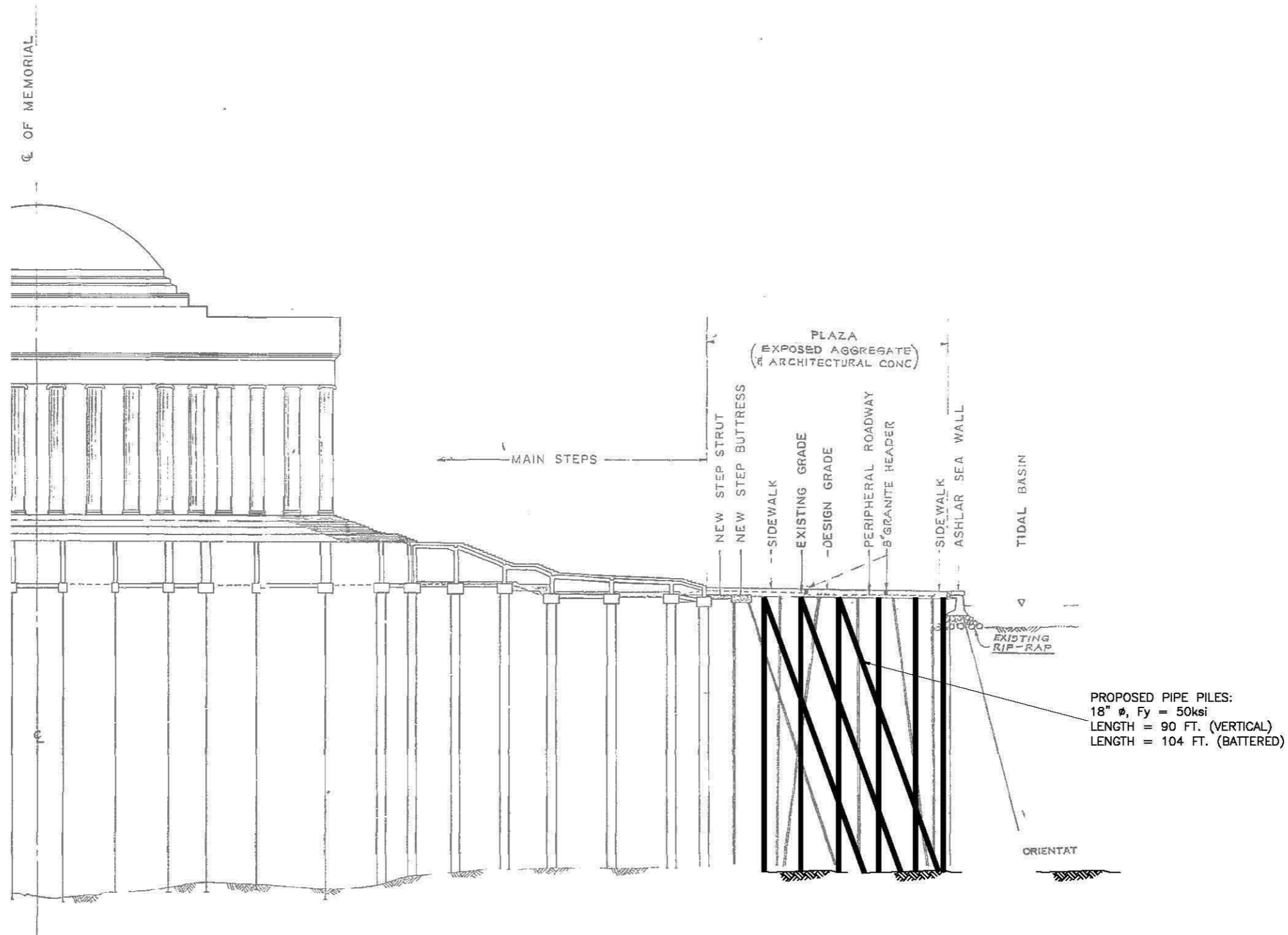
FIGURE 15



NOTE:
GEOMETRY BASED ON
HISTORICAL DOCUMENTS AND
MUST BE VERIFIED IN FIELD.

A/E FIRM HNTB ARCHITECTURE SCHNABEL ENGINEERING	Mark	Sheet	REVISION	Date	Initial	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION	DW/CJR/HR NSF/SCB JG CHECKED
	REMEDATION OF NORTH PLAZA - EAST SIDE						
SUB SHEET NUMBER						128232 DATE 3/6/08 DWG. NO. 808/80284	

3/19/08 09:00 NFAHEY R17 G:\2006\085\06150078.B JEFFERSON MEMORIAL PREDESIGN & SCHEMATIC DESIGN CAD\FINAL PREDESIGN\SHELEV-PLAZA.DWG IMAGES: C:\PROPOSAL\7150243.A0\CADD\IMAGES\SUB_40001 - SHEET 10.TIF

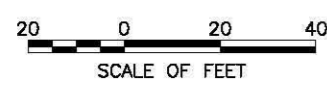


PROPOSED PIPE PILES:
 18" ϕ , $F_y = 50\text{ksi}$
 LENGTH = 90 FT. (VERTICAL)
 LENGTH = 104 FT. (BATTERED)

NOTE:
 GEOMETRY BASED ON
 HISTORICAL DOCUMENTS AND
 MUST BE VERIFIED IN FIELD

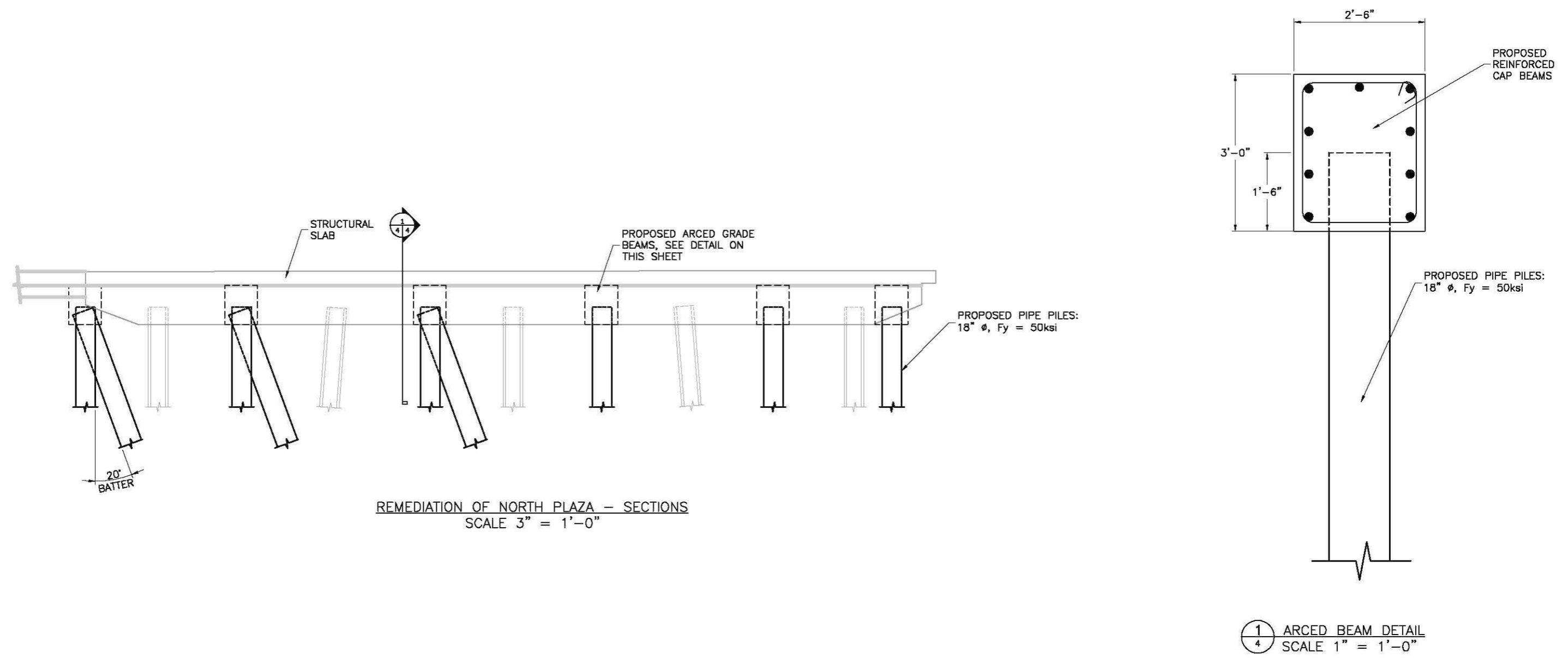
REMEDATION OF NORTH PLAZA - ELEVATION
 SCALE 1" = 20'-0"

FIGURE 16



A/E FIRM HNTB ARCHITECTURE SCHNABEL ENGINEERING	Mark	Sheet	REVISION	Date	Initial	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION	DW/CJR/HR NSH/SCB JG CHECKED
	REMEDIATION OF NORTH PLAZA - ELEVATION TITLE OF DRAWING						REPAIR & CONTROL SETTLEMENT TITLE OF PROJECT THOMAS JEFFERSON MEMORIAL LOCATION WITHIN PARK NATIONAL MALL & MEMORIAL PARKS NAME OF PARK
SUB SHEET NUMBER							

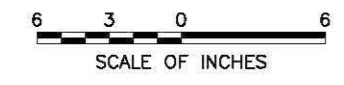
3/6/08 09:21 NEAHEY R17 G:\2008\08\06150078\B JEFFERSON MEMORIAL PREDESIGN & SCHEMATIC DESIGN\CADD\FINAL PREDESIGN\7DETAILS_PLAZA.DWG IMAGES: G:\PROPOSAL\7150243\AD\CADD\IMAGES\808_40001 - SHEET_31.TIF;



REMEDATION OF NORTH PLAZA - SECTIONS
SCALE 3" = 1'-0"

FIGURE 17

NOTE:
GEOMETRY BASED ON
HISTORICAL DOCUMENTS AND
MUST BE VERIFIED IN FIELD



A/E FIRM HNTB ARCHITECTURE SCHNABEL ENGINEERING	Mark	Sheet	REVISION	Date	Initial	SUB SHEET NUMBER	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION	HR/MD NSF/SCB JG
	REMEDATION OF NORTH PLAZA - SECTIONS TITLE OF DRAWING							REPAIR & CONTROL SETTLEMENT TITLE OF PROJECT THOMAS JEFFERSON MEMORIAL LOCATION WITHIN PARK NATIONAL MALL & MEMORIAL PARKS NAME OF PARK

**DIFFERENTIAL SETTLEMENT AT EAST AND
WEST ENDS**

**DIFFERENTIAL SETTLEMENT ALONG
NORTHWEST STAIRS**

Class C Construction Cost Estimate

Project: Jefferson Memorial Seawall and Plaza Repair

Park: Thomas Jefferson Memorial

PMIS: 128232

Basis of Estimate

Date of Estimate: 03/05/08

Estimated By: Kirk Associates
1177 Berkshire, Suite 100
Grosse Pointe Park, MI
(248) 240-9605

Supporting Material: Pre-Design Documents / Reports, 01/08

Cost Data: Square Foot Cost Data.
Unit Prices based on 2008 Cost data
Conversations with Consulting Engineers

Mark-ups and Add-ons: **Published Location Factor:** RS Means (Washington, D.C.).
Project Remoteness: Site is in downtown Washington D.C. (dense urban)
Federal Wage Rate Factor: 6 Percent Guidance from NPS.
Design Contingency: Limited Detail on Pre-Design Report, however this is a small project. 25 percent seems appropriate.
Taxes: 4.75 Percent Sales Tax included in Unit Costs
Standard General Conditions: Above Normal Range of 18 Percent due to equipment needs.
Government General Conditions: 10 Percent within NPS Guidance Recommendations.
Bonds and Permits: 1.5 percent bond included in General Conditions. No permit costs.
Historic Preservation Factor: Memorial cost include 5% Historic Factor.
Overhead: Small Job, Limited sub-contractors due to work in region.
Profit: 10 Percent
Contracting Method Adjustment: No indication of what the construction contract will be, assume it require 25% premium (may be lower).
Inflation Escalation: Assume midpoint of construction to begin July, 2009 with 18 month construction period. Inflation predictions indicate 6% per year.

Comments: Work assumed to be completed by land based equipment
Park operations will be open in this area during the repair work
Removed materials will be kept on site before re-installation

Remediation Method for North Plaza and NW & NE Stairs: This alternative is for the remediation for the North Plaza and Northwest Stairs.

Class C Construction Cost Estimate

Project: Jefferson Memorial Seawall and Plaza Repair
 Park: Thomas Jefferson Memorial
 PMIS: 128232

Estimate By: S. Garrett
 Date: 03/05/08

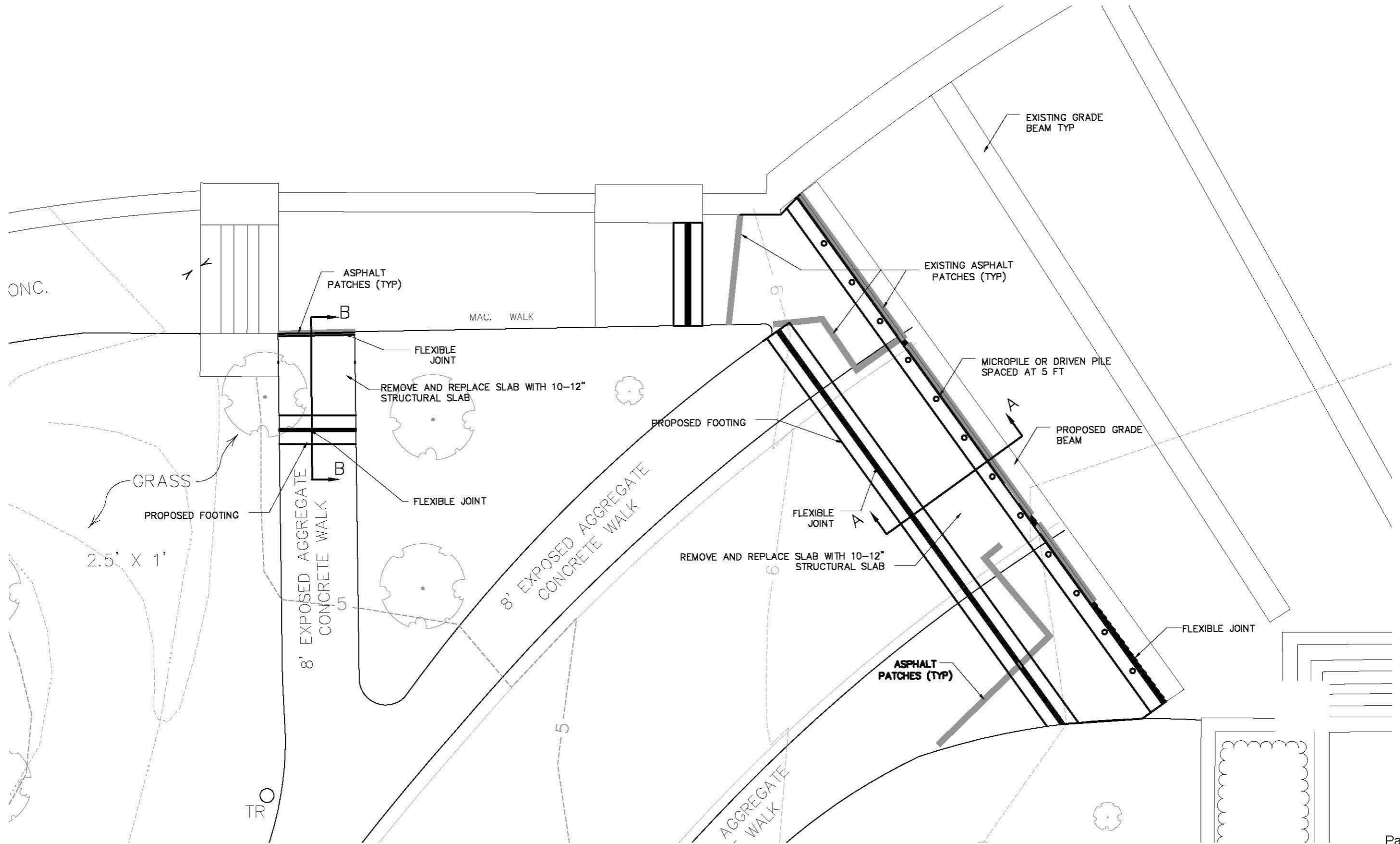
Remediation Method for North Plaza and NW & NE Stairs:

Reviewed By: R. Merrick
 Date: 02/26/08

Estimate is based on 2008 costs

Item No.	Description	Quantity	Unit	Cost/Unit	Total
1	Complete pre-work condition survey	1	LS	\$7,000.00	\$7,000
2	Install vibration monitoring equipment	1	LS	\$5,500.00	\$5,500
3	Remove stair slab	230	SF	\$12.00	\$2,760
4	Remove North Plaza Slab	900	SF	\$10.00	\$9,000
5	Remove and store North Plaza Granite features	2,091	SF	\$3.00	\$6,272
6	Excavate under slab	209	CY	\$30.00	\$6,278
7	Install new grade beams	29	CY	\$550.00	\$15,889
8	Install new concrete footing	22	CY	\$450.00	\$10,000
9	Install sacrificial micropile	2	EA	\$13,500.00	\$27,000
10	Conduct load test	2	LS	\$7,500.00	\$15,000
11	Install battered micropiles (90' length)	24	EA	\$13,500.00	\$324,000
12	Install new engineered fill	209	CY	\$35.00	\$7,324
13	Install new structural slab	1,130	SF	\$30.00	\$33,900
14	Install 3" exposed aggregate concrete topping slab	1,130	SF	\$13.50	\$15,255
15	Reinstall North Plaza Granite Features	2,091	SF	\$8.00	\$16,725
16	Install flexible joint	266	LF	\$32.00	\$8,512
17	Repair site damage from construction	1	Allowance	\$2,500.00	\$2,500
18	Complete post-work condition survey	1	LS	\$9,000.00	\$9,000
Subtotal Direct Construction Costs					521,915
	Published Location Factor	3.0%			15,657
	Remoteness Factor (urban)	0.0%			0
	Federal Wage Rate Factor	6.0%			15,657
	Design Contingency	25.0%			130,479
Total Direct Construction Costs					683,709
	Standard General Conditions	30.0%			205,113
	Government General Conditions	10.0%			68,371
	Historic Preservation Factor (Memorial)	5.0%			34,185
Subtotal NET Construction Cost					991,378
	Overhead	12.5%			123,922
	Profit	10.0%			99,138
Estimated NET Construction Cost					1,214,438
	Contracting Method Adjustment (Full Open)	5.0%			60,722
	Inflation Escalation (6.0% / Yr; 27 Months)	13.5%			163,949
Total Estimated NET Cost of Construction					1,439,100

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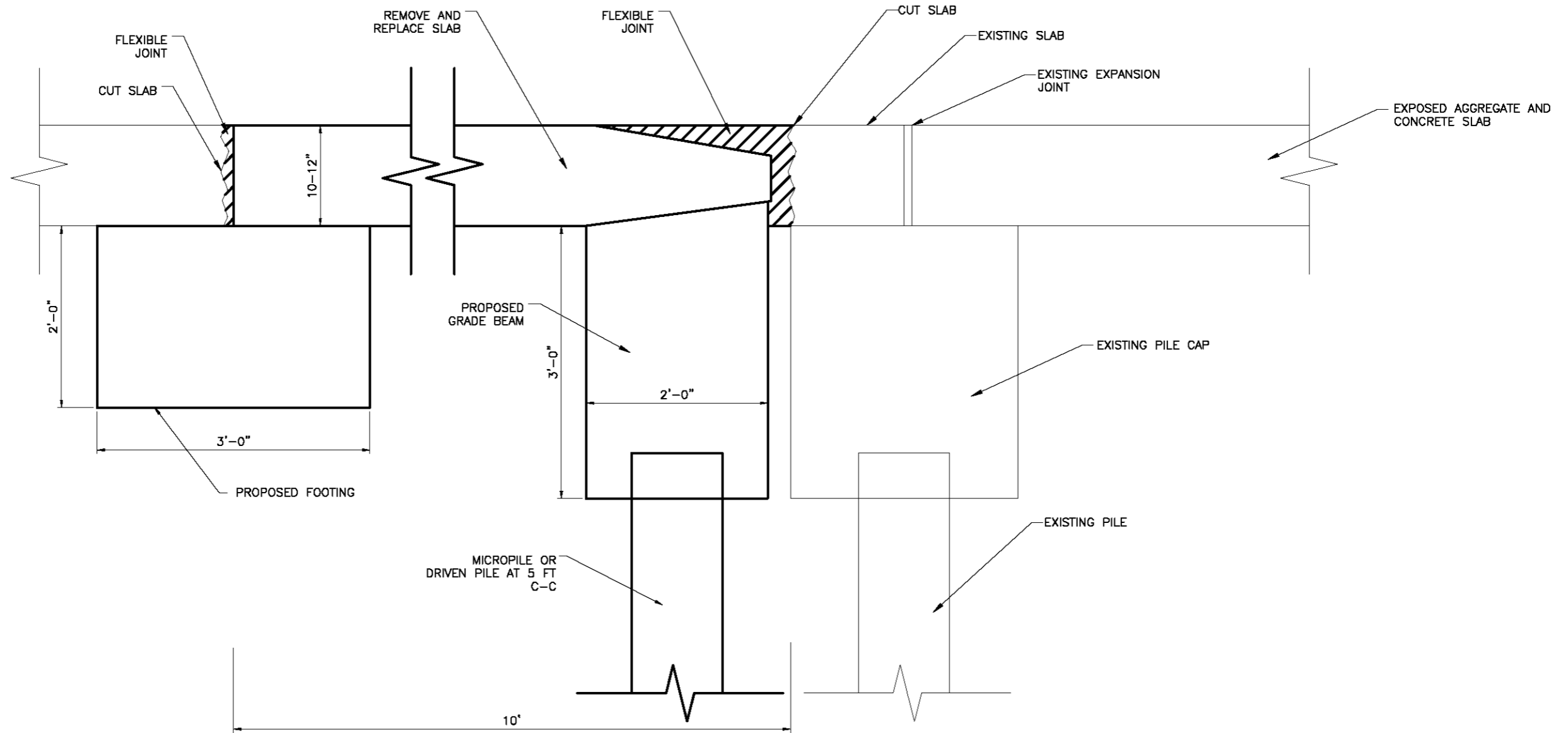


5 0 5 10
SCALE OF FEET

FIGURE 18

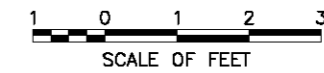
A/E FIRM HNTB ARCHITECTURE SCHNABEL ENGINEERING	Mark	Sheet	REVISION	Date	Initial	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION	DW/CJR/HR NSP/SCB JG
							REPAIR & CONTROL SETTLEMENT TITLE OF PROJECT THOMAS JEFFERSON MEMORIAL LOCATION WITHIN PARK NATIONAL MALL & MEMORIAL PARKS NAME OF PARK
NORTH PLAZA REPAIRS TITLE OF DRAWING						SUB SHEET NUMBER	

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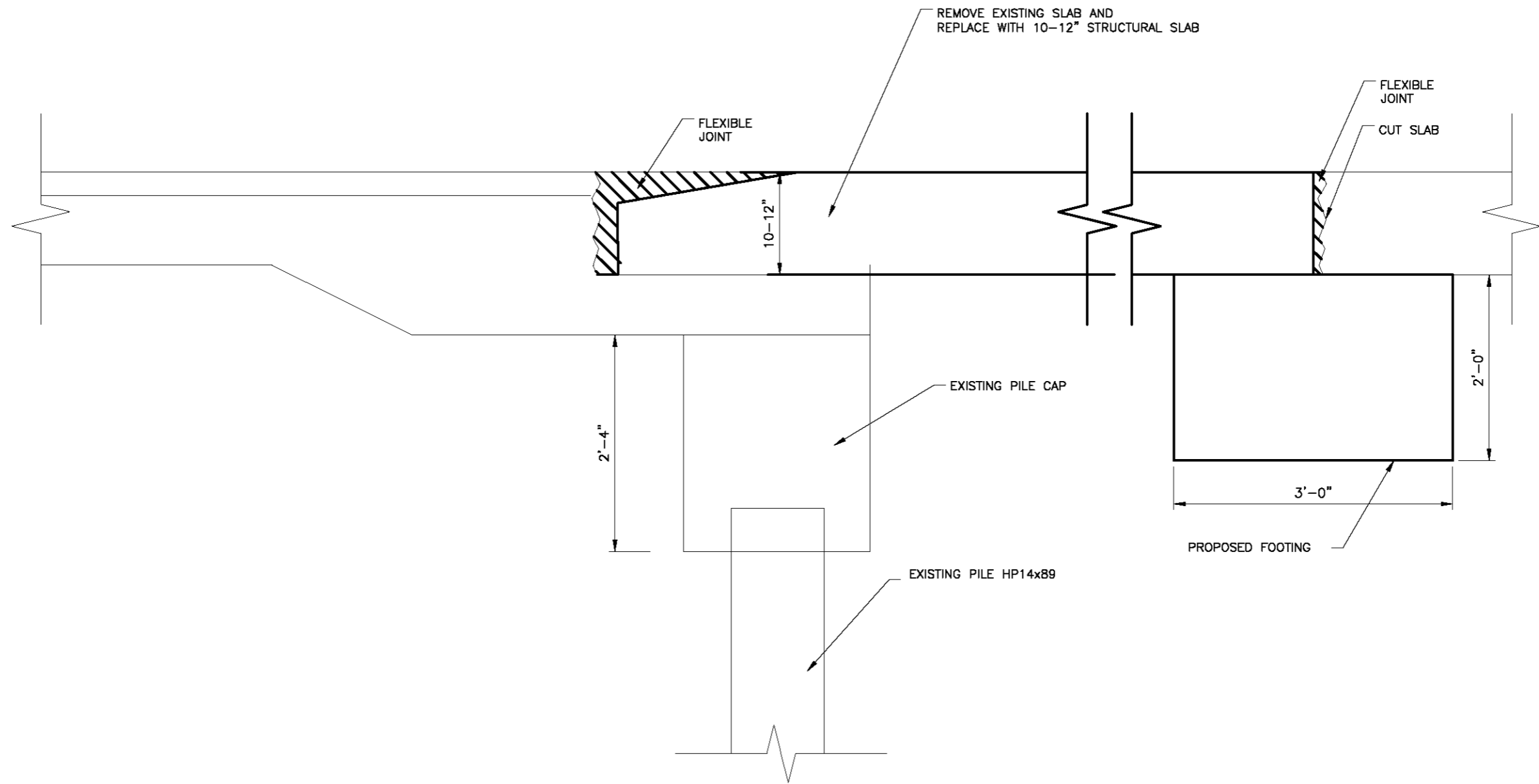
SECTION A-A
 ASPHALT PATCH REPAIRS - NORTH PLAZA
 3/4" = 1'-0"

FIGURE 19



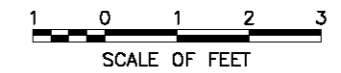
	A/E FIRM	Mark	Sheet	REVISION	Date	Initial		UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION	DW/CJR/HR <small>DESIGNED</small> NSF <small>DRAWN</small> JG <small>CHECKED</small>
	HNTB ARCHITECTURE								REPAIR & CONTROL SETTLEMENT <small>TITLE OF PROJECT</small> THOMAS JEFFERSON MEMORIAL <small>LOCATION WITHIN PARK</small> NATIONAL MALL & MEMORIAL PARKS <small>NAME OF PARK</small>
	SCHNABEL ENGINEERING	PROPOSED REMEDIATION FOR NORTH PLAZA				SUB SHEET NUMBER			
		<small>TITLE OF DRAWING</small>							

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SECTION B-B
 ASPHALT PATCH REPAIRS – NORTHWEST STAIRS
 3/4" = 1'-0"

FIGURE 20



A/E FIRM HNTB ARCHITECTURE SCHNABEL ENGINEERING	Mark Sheet	REVISION	Date	Initial	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE - NATIONAL CAPITAL REGION BRANCH OF DESIGN AND CONSTRUCTION	DW/CJR/HR <small>SCALED</small> NSF <small>DATE</small> JG <small>CHECKED</small>
	PROPOSED REMEDIATION NORTHWEST STAIRS <small>TITLE OF DRAWING</small>	SUB SHEET NUMBER	REPAIR & CONTROL SETTLEMENT <small>TITLE OF PROJECT</small> THOMAS JEFFERSON MEMORIAL <small>LOCATION WITHIN PARK</small> NATIONAL MALL & MEMORIAL PARKS <small>NAME OF PARK</small>			<small>PROJECT NO.</small> 128232 <small>DATE</small> 3/6/08 <small>DWG. NO.</small> 808/80284

III. COST COMPARABILITY ANALYSIS

The Cost Comparability Analysis evaluates the anticipated cost of the Jefferson Memorial project based on the costs associated with three comparable projects. Jefferson Memorial is compared to projects at Ellis Island, the New Jersey Turnpike, and the Children's Hospital in Washington, DC. The projects are analyzed according to four assets, which are characteristic to the projects listed above. These assets include: underpinning with deep foundation elements, reinforced concrete, temporary cofferdams, and mobilization.

Ellis Island underwent a seawall repair that utilized micropiles and reinforced concrete to stabilize the wall. Sheet piling was used to contain the concrete at the base of the wall. Although the sheet piling in this project was permanent, the cost is comparable to the temporary cofferdam.

The project at the New Jersey Turnpike was a rehabilitation of existing bridges where micropiles were installed to transfer part of the load from the existing piles. Reinforced concrete was used to connect the micropiles to the pile cap. This project overcame difficulties associated with limited headroom and construction along a waterway. A temporary cofferdam was utilized to allow for construction in a waterway.

The Children's Hospital project retrofitted existing foundations to allow additional load to be placed on the structure. This project also utilized micropiles as an underpinning solution. Although a temporary cofferdam was not necessary in this project, dewatering of excavations required for the installation of the pilecaps was necessary. The dewatering was achieved by installing shoring on the excavation walls and pumping water from the bottom of the excavation.

The analysis examines the quantities of each asset and their associated cost. The costs are projected to 2010, which is the anticipated start of construction.

Considering the unit cost of the primary asset, the anticipated cost of the Jefferson Memorial project is in the lower portion of the cost range of the other projects in this comparison. It is 34% less than the unit cost at Ellis Island, 28% more than the unit cost at the New Jersey Turnpike, and 22% less than the unit cost at the Children's Hospital. The average unit cost of the three comparisons is \$219.61; therefore, the unit cost of Jefferson Memorial is 19% below the average.



Project Title: *Ellis Island Seawall Repair*

Location: *Jersey City, New Jersey*

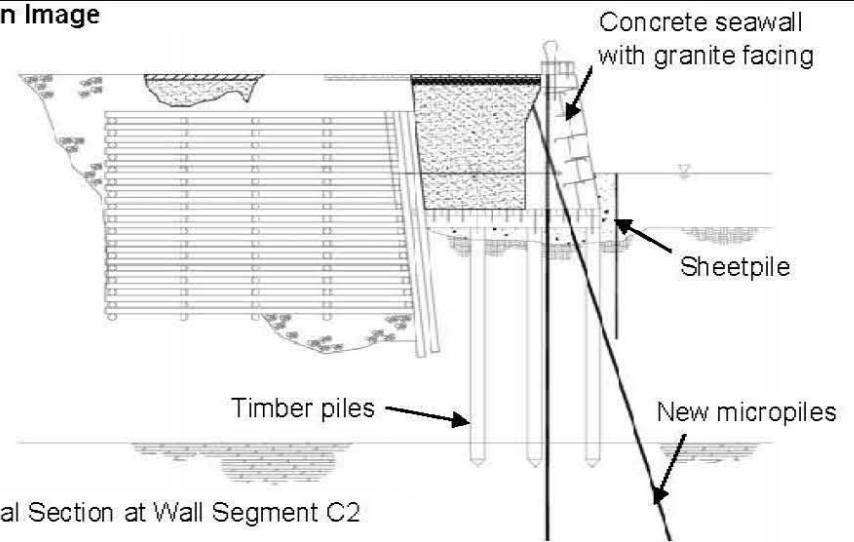
Year Completed: *2007 (walls completed to date)*

Program Summary: *Located in the Upper New York Bay, the historic Ellis Island attracts almost 4 million visitors each year. The seawalls that surround the Island were constructed in the early 1900s and now show varying degrees of deterioration. This is evidenced by erosion of mortar joints, dislodged granite blocks along the wall face, decay of wood cribbing, washout from behind the seawall, and local wall displacements compromising its stability at some locations.*

An innovative approach to the repair of the seawalls was developed, which consisted of the use of micropiles for stabilization of vertical and horizontal seawall movements. The micropiles were installed through the existing seawalls and penetrated through a thick overburden, consisting of soft alluvial deposits and relatively hard glacial till, and were bonded into Manhattan Schist. Drilling of the micropiles often encountered timber and other obstructions.

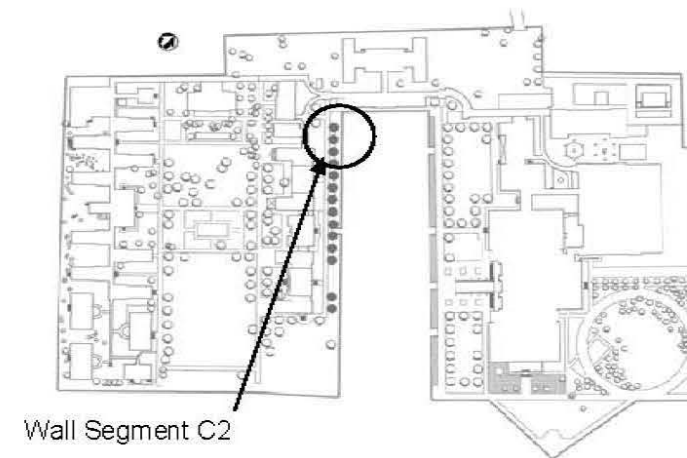
This project is uniquely challenging due to the balance of historical preservation, aesthetics, economics, and feasibility that is required for all design aspects.

Elevation Image



Typical Section at Wall Segment C2

Plan Image



Wall Segment C2



Project Title: **NJTA Pile Rehabilitation Maintenance**

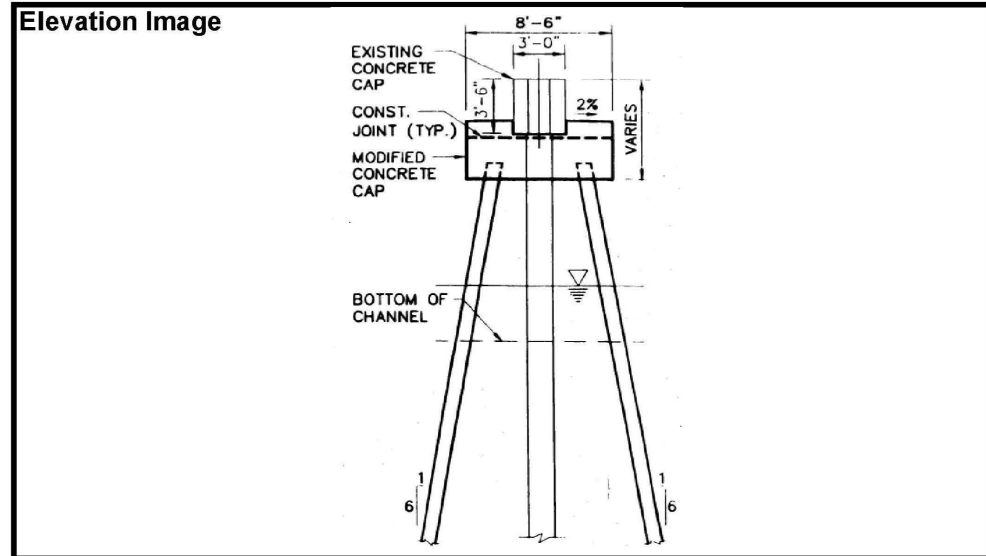
Location: **Gloucester, New Jersey**

Year Completed: **2006**

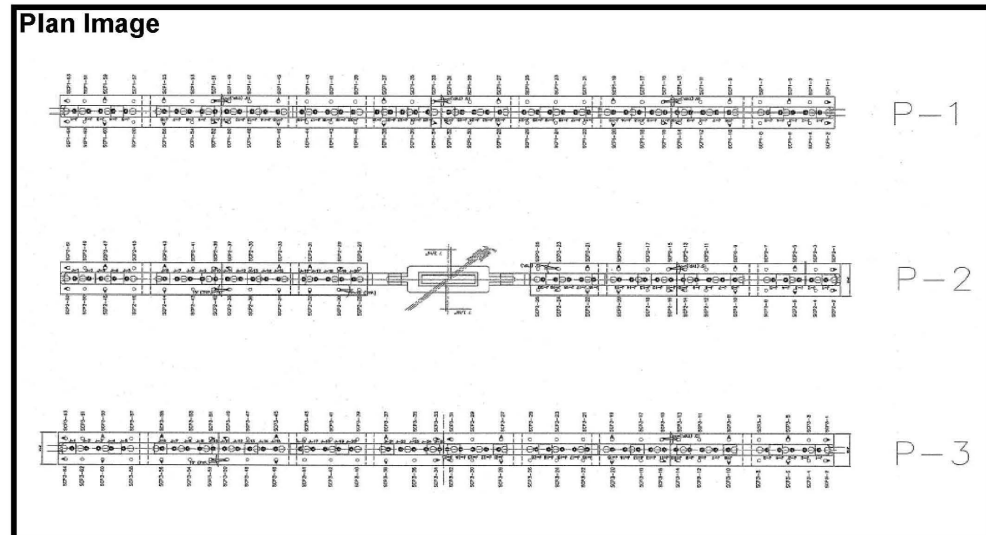
Program Summary: Pile rehabilitation maintenance was performed on several bridges along the New Jersey Turnpike. As part of this maintenance, micropiles were added to pier and abutment caps for each structure to replace existing piles. A total of 260 micropiles were installed as part of this retrofit effort. This project required 180 micropiles to be installed through granular soils, while the other 80 micropiles were installed in predominantly fine soils.

The micropiles consisted of hollow core bars installed under limited headroom conditions. The upper portion of the micropiles included permanent steel casing to provide buckling and bending capacity along the exposed portion of the micropiles and the potential scour zone. The hollow core bars were bonded to the soil with varying bond lengths, depending on the location of the micropile. The micropiles were connected through new cap beams.

Elevation Image



Plan Image





Project Title: *Children's Hospital Addition - CPS*

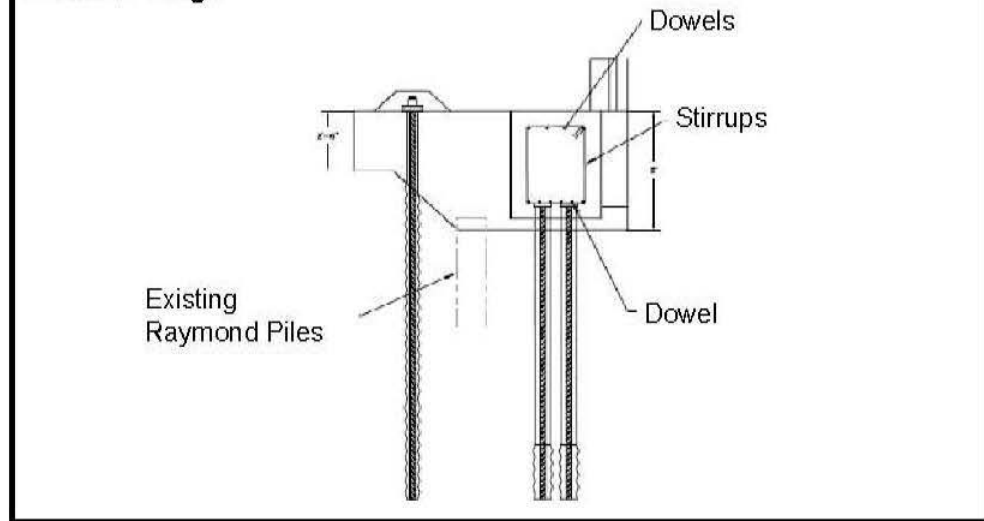
Location: *Washington, DC*

Year Completed: *2007*

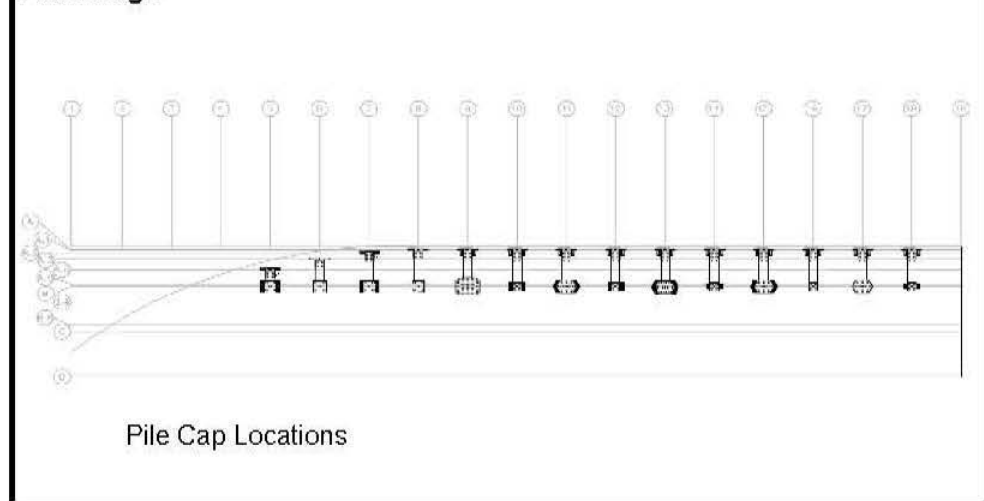
Program Summary: Opening its doors over 130 years ago, the Washington D.C. Children's National Medical Center (CNMC), currently ranks as the 9th best pediatric institution in America. As the reputation of the hospital grows, there is an increasing demand on the available space. To meet the growing demand of floor space, the hospital is currently expanding the surgical wing up to five stories. The proposed construction consists of an addition on the northern side of the existing building. This area currently consists of only three levels of below grade parking with no levels above grade.

This analysis focuses on the retrofitting of the existing foundation to support the additional load, which results from the new floors added above the existing structure. The original foundations include Raymond Step-Tapered piles with an 80-ton capacity. New loading on the foundation requires each Raymond pile to have a capacity of 150 tons. The design and construction of the foundation upgrading work was particularly challenging due to various project constraints related to high ground water table, installation of micropiles under limited head room, and keeping the parking garage fully operational for the whole duration of the construction.

Elevation Image



Plan Image



Cost Comparability Analysis



National Park Service

	Current NPS Project PMIS #:	Comp 1	Comp 2	Comp 3
Project Title	Jefferson Memorial	Ellis Island Seawall Repair	NJTA Pile Rehabilitation Maintenance	Children's Hospital Addition - CPS
Location	Washington, DC	Jersey City, NJ	Gloucester, NJ	Washington, DC
Year Completed	2010	2007	2006	2007
Construction Type ¹	Repair / Rehabilitation	Repair / Rehabilitation	Repair / Rehabilitation	Repair / Rehabilitation
Primary Asset Category ^{2,3}	9999 Underpinning with Deep Foundation Elements	9999 Underpinning with Deep Foundation Elements	9999 Underpinning with Deep Foundation Elements	9999 Underpinning with Deep Foundation Elements
Primary Asset Size (Quantity)	24525	4319	18500	2960
Unit of Measure	Linear Feet	Linear Feet	Linear Feet	Linear Feet
Cost of Primary Asset	\$4,342,455.00	\$960,227.00	\$2,035,000.00	\$561,000.00
Unit Cost of Primary Asset	\$177.06	\$222.33	\$110.00	\$189.53
Second Asset Category	9999 Reinforced Concrete	9999 Reinforced Concrete	9999 Reinforced Concrete	9999 Reinforced Concrete ⁵
Second Asset Size (Quantity)	1731	70	880	77
Unit of Measure	Cubic Yards	Cubic Yards	Cubic Yards	Cubic Yards
Cost of Secondary Asset	\$1,637,829.00	\$69,339.30	\$959,200.00	\$685,000.00
Unit Cost of Secondary Asset	\$946.18	\$990.56	\$1,090.00	\$8,896.10
Third Asset Category	9999 Temporary Cofferdam	9999 Temporary Cofferdam	9999 Temporary Cofferdam	9999 Temporary Cofferdam ⁵
Third Asset Size (Quantity)	182	75	950	1
Unit of Measure	Linear Feet	Linear Feet	Linear Feet	Lump Sum
Cost of Third Asset	\$524,926.00	\$61,125.00	\$807,500.00	\$60,000.00
Unit Cost of Third Asset	\$2,884.21	\$815.00	\$850.00	\$60,000.00
Fourth Asset Category	9999 Mobilization	9999 Mobilization	9999 Mobilization	9999 Mobilization ⁷
Fourth Asset Size (Quantity)	1	1	1	1
Unit of Measure	Lump Sum	Lump Sum	Lump Sum	Lump Sum
Cost of Fourth Asset	\$14,399,390.00	\$143,510.73	\$500,000.00	\$30,000.00
Unit Cost of Fourth Asset	\$14,399,390.00	\$143,510.73	\$500,000.00	\$30,000.00
Total Project Cost	\$20,904,600.00	\$1,234,202.03	\$4,301,700.00	\$1,336,000.00
Year of Comparability Analysis	2010	2010	2010	2010
Comparable Primary Asset Unit Cost (Year of Comparison) ⁴	\$177.06	\$264.79	\$139.87	\$225.73

- 1 Designate "New Construction" or "Repair/Rehab."
- 2 Primary asset type should only be the comparable project components that correspond to current NPS project.
- 3 See "Assets Code" tab for assets code and categories.
- 4 For each comparable, primary unit assets' costs shall be escalated to the proposed date of construction for the NPS project.
- 5 Includes removal of existing concrete slab, excavation for pilecaps and lagging and dewatering of excavation.
- 6 Temporary lagging and dewatering was used for the installation of pilecaps. This cost covers for additional chemical grout installed at the bottom of excavation for pilecaps to control ground water.
- 7 Includes mobilization of equipment for the installation of the micropiles. The mobilization of equipment to perform dewatering and install pilecaps is included in the prices presented for second asset category (Reinforced concrete).

Notes: For the Jefferson Memorial quantities and costs, consider the following:

1 Ashlar Seawall:

Asset 1 includes items 1, 2, 9, 10, 11, 12, 13, 14, and 20.

Asset 2 includes items 3, 4, 17, 18, and 19.

Asset 3 includes items 5, 6, 7, 8, 15, and 16.

Asset 4 includes additional construction costs.

2 North Plaza:

Asset 1 includes items 1, 2, 7, 8, 9, 10, and 14.

Asset 2 includes items 3, 4, 5, 6, 11, 12, and 13.

Asset 3 is not applicable to this section.

Asset 4 includes additional construction costs.

3 Remediation Method for North Plaza and NW & NE Stairs:

Asset 1 includes items 1, 2, 8, 9, 10, and 15.

Asset 2 includes items 3, 4, 5, 6, 7, 11, 12, 13 and 14.

Asset 3 is not applicable to this section.

Asset 4 includes additional construction costs.

IV. SCOPE AND COST VALIDATION

The Scope and Cost Validation confirms whether the scope of work is sufficient to complete the project, and comments on the accuracy of the cost estimate. This attempts to identify and correct any potential problems prior to continuing with the Schematic Design. The Project Program, Class C Cost Estimate, and Cost Comparability Analysis were used to create the Scope and Cost Validation.

The PMIS Project Statement does not fully describe the differences in the movements of the Ashlar Seawall and the North Plaza. The lateral movement of the North Plaza should be addressed with greater detail as indicated in the following responses.

The PMIS Class C Cost Estimate is not sufficient to address the remediation of both the Seawall and North Plaza. Of these two, only the remediation of the Seawall meets this requirement.



Preparation Date: 3/06/08

Park: National Mall and Memorial Parks

PMIS #: 128232 Construction Year: 2009

Project Title: Emergency Repairs for Settlement at the Jefferson Memorial Seawall

Financial Data

PMIS Class C Construction Cost Estimate: \$8,050,000 (net)

Project Program Class C Construction Cost Estimate: \$19,353,300.00 (net)

See "[Scope and Cost Validation Documentation](#)" definition for additional information.

Answers to the following questions shall not exceed two pages per numbered question.

1. EXISTING CONDITIONS - Does the PMIS Project Statement adequately describe the current level of performance and/or functionality being provided (i.e. describe current conditions)? If not, provide additional description(s) of the existing performance and/or functionality, as necessary, to complete current conditions.

Schnabel Response: The Project Statement does not fully describe the current conditions at the site. Movement of two elements of the Memorial has been observed. These two elements are defined as the Seawall and the North Plaza. The Seawall and North Plaza are supported by separate foundation elements. Movement in the Seawall has been observed horizontally and vertically, while the North Plaza movement has only been observed horizontally. Although the direction of movement is similar in the two elements, the rates of movements are not consistent between the Seawall and the North Plaza.

We recommend replacing the Justifications section of the Project Statement with the following:

"The Jefferson Memorial is a National Historic Landmark and is listed as a contributing structure within the East and West Potomac Parks Historic District. The structure and the site are open daily to the public and are also the location of numerous public functions and major events. In late March of 2006, it was brought to the attention of the park maintenance staff that the Seawall and North Plaza had separated several inches at the northwest and radiated out to the northeast to a lesser degree. The separation was both vertical and horizontal in nature and was several inches and formed a tripping hazard to the public. A temporary fence was placed along the northern perimeter to prevent public access to the worst section of the hazard and cold patches were applied to various public areas to prevent tripping. Historical evidence indicates that similar settlement was an issue commencing from initial construction and corrections were made over 30 years ago to correct the settlement that appeared to be successful until the present conditions appeared. After several months of survey monitoring, the Seawall appears to be moving



both horizontally and vertically, while the North Plaza movement has only been observed horizontally. Although the direction of movement is similar in the two elements, the rates of movements are not consistent between the Seawall and the North Plaza. The movements appear to be still active and may result in catastrophic failures and endangerment to the visiting public if not resolved quickly. Further movement is expected and a solution addressing the cause(s) of the movement must be implemented to prevent further degradation and impairment to the site.”

2. IDENTIFIED PROJECT GOALS - Does the PMIS Project Statement adequately describe the proposed level of performance and/or functionality required? If not, provide additional description(s) of any proposed level of performance and/or functionality required that is not described in the PMIS Project Statement.

Schnabel Response: The Project Statement adequately describes the level of performance and functionality of the Seawall and Plaza structures, and adequately describes the impact on the functionality and structural integrity of the structures, if remediation does not occur.

3. REQUESTED SCOPE - Does the PMIS Project Statement adequately describe the capital investments needed to optimally close the performance gap between existing performance and required performance levels? Provide description(s) and Class C Construction Cost Estimates for each capital improvement required to optimally close the performance gap and which were not shown in the PMIS Project Statement. For each capital improvement, clearly identify the benefits accrued to the project by adding the capital improvement(s) to the existing PMIS Project Statement SOW. Provide a side by side comparison of existing PMIS Project Statement scope and cost estimate and new proposed scope and cost estimate required to close the functional needs.

Schnabel Response: The Project Statement does not adequately describe the capital investments needed to optimally close the performance gap between existing performance and required performance levels. Although the PMIS Project Statement does adequately describe the level of performance required for remediation, the PMIS Class C Cost Estimate does not sufficiently cover the level of performance required. The PMIS Class C Cost Estimate is based on remediation of the Seawall and Northwest Stairs and Walkway and West Terrace Walk, but does not include the cost for remediation of the North Plaza. Class C cost estimates have been provided as part of the Predesign documentation. In addition to the alternatives provided in the Predesign, additional alternatives are under development, with cost estimates, that will be discussed in the Value Analysis Meeting. Below is a side by side comparison.



Existing PMIS Project Statement	PMIS Class C Cost Estimate	Predesign Elements	Class C Cost Estimates
Remediation of Seawall and Transition Areas to include Northwest Stairs and Walkway and West Terrace Walk	\$8.05M	<u>Seawall Remediation</u> – Remediation of the Seawall addresses the imminent failure of the Seawall but does not eliminate the life safety hazards in and around the plaza, nor does it provide lateral restraint against lateral movement of the North Plaza.	\$7.3M
		<u>Northwest Stairs and Walkway and West Terrace Walk Remediation</u> – If this remediation does not take place, then the life safety hazards in and around the plaza will still exist.	\$1.4M
		<u>North Plaza Remediation</u> - If the North Plaza is not addressed, then it will likely continue to move laterally. The plaza slab joints would continue to open and the plaza will eventually begin to “push” on the seawall. In addition, if this remediation does not take place, then the life safety hazards in and around the plaza will still exist.	\$10.6M

4. FUNDING ANALYSIS - Does the existing budget (PMIS Class C Cost Estimate) provide a viable solution sufficient to solve the PMIS stated problem (SOW)? If the PMIS Project Statement SOW and budget do not fully close the required performance gap, provide an analysis of what performance and/or functional improvements can be provided within the existing budget (PMIS Class C Cost Estimate), and what performance and/or functional improvements would be deleted. Analysis should include a description of the impacts related to deleted work.

Schnabel Response: The existing budget (PMIS Class C Cost Estimate, \$8.05M) does not provide a viable solution sufficient to solve the PMIS stated problem (SOW). Remediation of the Seawall (~\$7.3M) meets the PMIS Class C Construction Cost



Estimate. Remediation of the Seawall addresses the imminent failure of the Seawall but does not eliminate the life safety hazards in and around the plaza, nor does it provide lateral restraint against lateral movement of the North Plaza. Remediation of the North Plaza (\$10.6M) is not sufficiently covered by the PMIS Class C Construction Cost Estimate. If the North Plaza is not addressed, then it will likely continue to move laterally. In addition, if this remediation does not take place, then the life safety hazards in and around the plaza will still exist. Finally, remediation of the Northwest Stairs and Walkway and West Terrace Walk (\$1.4M) also is not sufficiently covered by the PMIS Class C Construction Cost Estimate; however, when combined with the Seawall remediation, it is within 10% of the existing PMIS Cost Estimate. If this remediation does not take place, then the life safety hazards in and around the plaza will continue to exist.

V. WRITTEN RESPONSES TO REVIEW COMMENTS

DENVER SERVICE CENTER
Quality Assurance

NAMA 128232		Project Title: Repair and Control Settlement at Jefferson Memorial Seawall, North Plaza, and Transition Areas	
DBB (X) or DB ()	Milestone: () HSR (X) PD () SD () DD () CD-100% Draft () CD-100% Complete Other: ()		
Construction FY:	Proposed Award Date: ()	Proposed Midpoint of Construction Date: ()	
Contracting Method: () Non-Competitive (Sole Source - 8A, Service Disable, Hub Zone)		(X) Full & Open (Competitive Negotiation)	
() Limited Competition (Comp. Neg. - Hub Zone, Comp. 8A, Small Bus. Set Aside)		() Full & Open (Seal Bid - Low Price)	
A/E Prime: HNTB	NPS Project Manager: Pat Mac Donald	Phone No.: 6621	
QA Due Date: 2/25/08	NPS Project Specialist: Doug Denk	Phone No.: 2236	
	NPS Contracting Officer: Margaret Lemke	Phone No.: 2039	
QA Completed & Posted Date: 2/25/08 w/o Estimating Comments; 2/27/08 Complete		NPS Contract Specialist: Eric Weisman	Phone No.: 2055

Remarks/Special Instructions: 52.236-23 Responsibility of the Architect-Engineer Contractor.

RESPONSIBILITY OF THE ARCHITECT-ENGINEER CONTRACTOR (APR 1984)

(a) The Contractor shall be responsible for the professional quality, technical accuracy, and the coordination of all designs, drawings, specifications, and other services furnished by the Contractor under this contract. The Contractor shall, without additional compensation, correct or revise any errors or deficiencies in its designs, drawings, specifications, and other services.

(b) Neither the Government's review, approval or acceptance of, nor payment for, the services required under this contract shall be construed to operate as a waiver of any rights under this contract or of any cause of action arising out of the performance of this contract, and the Contractor shall be and remain liable to the Government in accordance with applicable law for all damages to the Government caused by the Contractor's negligent performance of any of the services furnished under this contract.

SEE THE TABS AT THE BOTTOM OF THIS FORM FOR INDIVIDUAL REVIEW COMMENTS

Quality Assurance review comments shall apply to all issues throughout the review set that have either identical or similar concerns. No attempt is made to identify all occurrences. The contractor's own Quality Control shall ensure that these review comments are thoroughly resolved prior to any subsequent submittals.

Discipline (route only to marked boxes):	Summary Comments:	
√ Civil Engineering (CE)	LRT 2/21/08 Refer to comments.	
√ Landscape Architecture (LA)	JHC 2/25/08 see comments	
√ Architecture (AR) / Lighting (LT)	2/25/08 Refer to comments	
√ Preservation Architecture (PA)	CRJ 2/20/08 No Comments	
√ Structural Engineering (SE)	LLR 2/19/08 Refer to comments.	
Mechanical Engineering (ME)		
Electrical Engineering (EE)		
√ Safety Engineer (SF)	bo 2/19/08 No Comments	
Constructability (CN)		
√ Estimating (EST)	RAM 2/26/08 Refer to Comments	
NPS-10 (ET)		
Natural Resource Specialist (NRS)		
Cultural Resource Specialist (CRS)		
√ Project Specialist (PS)	2/25/08 Refer to comments	
√ Project Manager (PM)	2/25/08 Refer to comments	
√ Park	Refer to comments	
√ Region	n/a	
√ Others	n/a	

Construction Cost Estimating Review



Park Name: Jefferson Memorial Park Alpha Code: NAMA

Project Title: Repair & Control Settlement at Jefferson Memorial Seawall, North Plaza, & Transition Areas PMIS #: 128232

Region: National Capital

Project Manager: MacDonald

Proposed Date of Mid-point of Construction: July, 2009

Net Available Construction Funds: _____

Date Of Estimate: 11-Feb-08

Estimate Escalated to: July, 2009
Date

Level of Estimate:
Circle One Class C Class B Class A

Associated Design Submittal:
Circle One PD Submittal SD/DAB Submittal DD Submittal Draft 100% CD Submittal Final 100% CD Submittal

Estimated By: Kirk Associates
Primary Estimator, Firm and Contact Information

Estimated Total NET Construction (Base): \$20,904,600
Estimated Total NET Construction (Highest Price Option): \$0
Estimated TOTAL NET Construction (Base with Options): \$20,904,600

Estimate Reviewed By: Robert A. Merrick, PE Review Date: _____

Review Comments:
Estimate appears to be complete and professionally prepared. There is an overall difference in the NPS recommended cost and the submitted cost of about 10%. For a pre-design package of this size and type, this is not a significant difference. Major differences are in application of some of the mark-ups.

Approval Status:



Not Accepted



Accepted with Comments



Accepted

Signature of disapproving official

Date

Robert A. Merrick

2/26/2008

Signature of approving official

Date

Signature of approving official

Date

Comments:

Initial & Date your comments!

DENVER SERVICE CENTER
Quality Assurance

NAMA 128232

CIVIL ENGINEERING

REVIEWER: Lawrence R. Torrez (303) 969-2697

DATE REVIEWED: 2/21/2008

NO.	DWG or SPEC SECTION	QUALITY ASSURANCE COMMENT	RESPONSE
1	Task Order	Part 1.2.1, Perform Surveying and Monitoring and Data Collection: This part of the Task Order should be emphasized in the Pre-Design Report (Project Program) as the results of this year-long data collection (with quarterly monitoring) could quite possibly affect the recommended alternatives for settlement corrections.	The Predesign effort for this project includes quarterly survey monitoring of 22 points on the Ashlar Seawall and North Plaza, and quarterly data collection from the inclinometers, piezometers, tiltmeters, and ground water monitoring wells. This information will be used to verify the mechanisms of soil and structure movement considered in the design. This information was added to the Predesign document. - SEI
2	Class C Cost Estimates	The "Seawall Alternative" is listed as "Seawall Alternative 3". Provide information documenting the other alternatives examined for the Seawall.	[Development of other alternatives is in progress and will be fully documented in the Schematic Design report. - NPS DSC D&C]
3	Class C Cost Estimates	The "North Plaza" is listed as "North Plaza Alternative 1". Provide information documenting the other alternatives examined for the North Plaza.	[Development of other alternatives is in progress and will be fully documented in the Schematic Design report. - NPS DSC D&C]

End of Review Comments

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NAMA 128232

LANDSCAPE ARCHITECTURE

REVIEWER: Joanne Cody (303) 969-2278

DATE REVIEWED: 2/25/08

NO.	DWG or SPEC SECTION	QUALITY ASSURANCE COMMENT	RESPONSE
1	pg.5-8	North plaza and west terrace walks - The site program does not identify requirements for rehab work. Needs to address accessibility and ability to maintain accessible grades and transitions at the completion of this project and for anticipated life of project.	Areas indicated to undergo work will be rehabilitated to comply with accessibility requirements. - HNTB
2	Sea wall	How will edge of seawall/north plaza interface be made safe for visitors? Need to provide tactile warning strips at the very least.	[Per Park, record documents do not indicate that the historic design of the seawall (no railing, use of differing surfaces to define edge of grounds) is a safety issue. Assuming Seawall & North Plaza repairs that will result in the Seawall capstones being once again flush with the top of the North Plaza, A-E shall evaluate options to announce the edge of the plaza adjacent to the Seawall through some sort of architectural element(s) as described in Scope of Work, Mod #01, Description of Work. - NPS DSC D&C]
3	pg. 34,35	Are these proposed fixes adequate to meet accessibility standards?	Areas indicated to undergo work will be rehabilitated to comply with accessibility requirements. - HNTB
4	current accessibility standards	http://www.access-board.gov/ada-aba/final.htm	Noted. - HNTB
5	Contextual analysis	Analysis needs to be included to identify acceptable surface materials and finishes.	The material selection will be completed at a future time. Materials chosen will respect historic character. - SEI
6		end of comments	

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NAMA 128232

ARCHITECTURE-LIGHTING

REVIEWER: Ed Nieto (303) 969-2577

DATE REVIEWED: 2/25/08

NO.	DWG or SPEC SECTION	QUALITY ASSURANCE COMMENT	RESPONSE
1		Will landscape lighting for safety/security be incorporated in this project?	The only lighting affected by the Predesign will be the in-slab lighting of the North Plaza. The intention is replacement in kind. - SEI
2			
3		(End of Comments).	

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NAMA 128232

STRUCTURAL ENGINEERING

REVIEWER: Larry L. Reynolds, P.E. (303) 987-6630

DATE REVIEWED: 2/19/2008

NO.	DWG or SPEC SECTION	QUALITY ASSURANCE COMMENT	RESPONSE
1	Summary Comment	There does not seem to be the same level of investigation and analysis for the North Plaza repairs as there is for the Seawall repairs. Refer to comments below.	
2	General	The Site Investigation Report , 1/30/08, page 119 states "Lateral movement of the north Plaza requires additional investigation." The Predesign report includes a Class C estimate for the North Plaza of just over \$11 million. How were the repair recommendations for the north Plaza developed? Was the additional investigation undertaken? Please clarify.	The "Investigation of Settlement and Upheaval at the Jefferson Memorial" dated 1/30/08 included the following site investigation and instrumentation: 7 soil borings, 3 ground water observation wells, 3 inclinometer casing locations, 2 vibrating wire piezometers, 2 tiltmeters, 142 survey monitoring points, and numerous locations where joints and differential settlements were measured. This report also recommended that additional piezometers be installed at varying depths and that continued monitoring be performed for the survey monitoring points, ground water wells, inclinometers, piezometers, and tiltmeters. Also, it recommends additional investigation in the form of joint measurements on the North Plaza. The Predesign task for this project includes quarterly monitoring of 22 survey monitoring points, and quarterly readings of the ground water wells, inclinometers, piezometers, tiltmeters, and measurements at joint locations. No further investigation has been authorized. - SEI
3	General	If the additional North Plaza investigation has not been completed, what kinds of further investigation are required to produce the necessary data so more specific recommendations can be developed? Please clarify.	Please refer to response above for recommendations from "Investigation of Settlement and Upheaval at the Jefferson Memorial" dated 1/30/08. - SEI

Page 55

STRUCTURAL ENGINEERING

REVIEWER: Larry L. Reynolds, P.E. (303) 987-6630

4	Page 26	Estimate shows removal of approximately 21,000 ft ² of North Plaza slab removal and replacement. Can this area be reduced by removing/replacing only those portions of the slab where new work is required? Please clarify.	For the Predesign documents, Schnabel was directed to provide the worst case scenario for remediation of the North Plaza, which was determined to be a full structural retrofit. Two additional remediation alternatives for the North Plaza are being developed and include varying amounts of slab removal and replacement. - SEI
5		End of review comments.	

Jefferson Memorial NAMA 128232
 Repair & Control Settlement at Jefferson Memorial Seawall, North Plaza, & Transition Areas
 Robert A. Merrick, PE Net construction
 26-Feb-08 A/E:
 Review: Draft Schematic Design Documents Submittal A/E Estimator: Kirk Associates
 PM: MacDonald

Estimate Date: 11-Feb-08
 Estimated NET Construction (Base) \$20,904,600
 Estimated NET Construction (Option) \$0
Estimated NET Construction (Total) \$20,904,600

Seawall

NPS Suggested Rates		NPS Computed Amounts	A/E Used Rates	A/E Computed Amounts
<u>Mark-ups:</u>	Shown for Base less mark ups	\$2,586,881		\$2,586,881
-0.9%	Location Factor	-\$23,282	3%	\$77,606
0%	Remoteness Factor	\$0		\$0
8%	Federal Wage Rate Factor	\$103,475	6.00%	\$77,606
5.75%	State & Local Taxes	\$74,373	included	\$0
30%	Design Contingency	\$776,064	25%	\$646,720
Total Direct Construction Costs		\$3,517,511		\$3,388,814
25%	Standard General Conditions	\$879,378	30%	\$1,016,644
10%	Government General Conditions	\$351,751	10%	\$338,881
5%	Historic Preservation Factor	\$175,876	10%	\$338,881
Sub-Total Net Construction Cost		\$4,924,516		\$5,083,221
15%	Overhead	\$738,677	12.5%	\$635,403
10%	Profit	\$492,452	10%	\$508,322
Estimate Net Construction		\$6,155,645		\$6,226,946
5%	Contracting Method Adjustment	\$307,782	20%	\$1,245,389
14%	Inflation Escalation FY10 (Annual Rate 6%)	\$861,790	13.5%	\$840,638
1.5%	Bond	\$111,552		\$0
Total Estimate Net Cost of Base Construction		\$7,436,769		\$8,312,973

-\$876,204 89.5%

North Plaza

NPS Suggested Rates		NPS Computed Amounts	A/E Used Rates	A/E Computed Amounts
<u>Mark-ups:</u>	Shown for Base less mark ups	\$3,434,667		\$3,434,667
-0.9%	Location Factor	-\$30,912	3%	\$103,040
0%	Remoteness Factor	\$0		\$0
8%	Federal Wage Rate Factor	\$137,387	6.00%	\$103,040
5.75%	State & Local Taxes	\$98,747	included	\$0
30%	Design Contingency	\$1,030,400	25%	\$858,667
Total Direct Construction Costs		\$4,670,288		\$4,499,414
25%	Standard General Conditions	\$1,167,572	30%	\$1,349,824
10%	Government General Conditions	\$467,029	10%	\$449,941
5%	Historic Preservation Factor	\$233,514	10%	\$449,941

	Sub-Total Net Construction Cost	\$6,538,404		\$6,749,121
15%	Overhead	\$980,761	12.5%	\$843,640
10%	Profit	\$653,840	10%	\$674,912
	Estimate Net Construction	\$8,173,005		\$8,267,673
5%	Contracting Method Adjustment	\$408,650	20%	\$1,653,535
14%	Inflation Escalation FY10 (Annual Rate 6%)	\$1,144,221	13.5%	\$1,116,136
1.5%	Bond	\$148,110		\$0
	Total Estimate Net Cost of Base Construction	\$9,873,985		\$11,037,343

-\$1,163,358 89.5%

Remediation Method for North Plaza & NW/NE Stairs

NPS Suggested Rates		NPS Computed Amounts	A/E Used Rates	A/E Computed Amounts	
<u>Mark-ups:</u>	Shown for Base less mark ups	\$483,663		\$483,663	
-0.9%	Location Factor	-\$4,353	3%	\$14,510	
0%	Remoteness Factor	\$0		\$0	
8%	Federal Wage Rate Factor	\$19,347	6.00%	\$14,510	
5.75%	State & Local Taxes	\$13,905	included	\$0	
30%	Design Contingency	\$145,099	25%	\$120,916	
	Total Direct Construction Costs	\$657,661		\$633,599	
25%	Standard General Conditions	\$164,415	30%	\$190,080	
10%	Government General Conditions	\$65,766	10%	\$63,360	
5%	Historic Preservation Factor	\$32,883	10%	\$63,360	
	Sub-Total Net Construction Cost	\$920,725		\$950,398	
15%	Overhead	\$138,109	12.5%	\$118,800	
10%	Profit	\$92,073	10%	\$95,040	
	Estimate Net Construction	\$1,150,906		\$1,164,237	
5%	Contracting Method Adjustment	\$57,545	20%	\$232,847	
14%	Inflation Escalation FY10 (Annual Rate 6%)	\$161,127	13.5%	\$157,172	
1.5%	Bond	\$20,857		\$0	
	Total Estimate Net Cost of Base Construction	\$1,390,435		\$1,554,257	-\$163,822 89.5%
Summary					
	Seawall	\$7,436,769		\$8,312,973	
	North Plaza	\$9,873,985		\$11,037,343	
	Remediation Method for North Plaza & NW/NE Stairs	\$1,390,435		\$1,554,257	
	Total	\$18,701,190		\$20,904,573	-\$2,203,383 89.5%

DENVER SERVICE CENTER

ESTIMATING

REVIEWER: Robert A. Merrick, PE

DATE REVIEWED: 2/26/2008

NO.	DWG or SPEC SECTION	QUALITY ASSURANCE COMMENT	RESPONSE
1	Overall	Estimate appears to be complete and professionally prepared. There is an overall difference in the NPS recommended cost and the submitted cost of about 10%. For a pre-design package of this size and type, this is not a significant difference. Major dif	Noted - KA
2	Unit Costs	For a pre-design package, unit costs and quantities appear to be a reasonable assessment of the work defined. No response necessary.	Noted - KA
3	Mark-ups	Location Factors: RS Means Published factor indicates the DC area is 99.1% of the National Average costs. Submitted estimate uses 3%. Difference is insignificant. No response necessary.	Noted - KA
4	Mark-ups	Standard General Conditions: Submitted Estimate uses 30%. This might be a little high, even for complexity of this project.	With the current construction complexity we feel 30% should be used. We will continue to monitor and adjust if necessary in later estimates based on the refined design. - KA
5	Mark-ups	Historic Preservation Factor: Submitted Estimate uses 10%. This might be slightly high.	Will revise to 5% - KA
6	Mark-ups	Contracting Method Adjustment: This project will most likely be procured with full/open competitive negotiation. 5% premium is probable.	Noted. Good discussion item at the value analysis workshop. - KA
7	Mark-ups	Inflation Escalation: NPS recommends 4% per year.	Noted, will monitor inflation. - KA
8		End of Comments	

DENVER SERVICE CENTER
Quality Assurance

NAMA 128232

PROJECT SPECIALIST

REVIEWER: D.Denk
DATE REVIEWED: 22-Feb-08

NO.	DWG or SPEC SECTION	QUALITY ASSURANCE COMMENT	RESPONSE
1	Page 6, 1st paragraph	State in what direction the North Plaza appears to be moving laterally, if this can be determined from existing data.	Please refer to "Investigation of Settlement and Upheaval at the Jefferson Memorial" dated 1/30/08, page 64, Figure 43. This figure shows the vector of lateral movement measured by inclinometer readings from Decemeber 2006 to January 2008. The data indicate that the soil 10 ft beneath the North Plaza is undergoing significant lateral displacement at an average rate of about 0.33 inches per year in the North-Northwest direction. This information was added to the PreDesign document. - SEI
2	Page 6, 1st paragraph	Does the opening of the joints on the North Plaza represent more than an aesthetic issue and tripping hazard? Could this movement create structural problems? Could this movement create continued problems with the Seawall if not addressed (even after proposed Seawall repairs are implemented)?	The opening of joints on the North Plaza indicate that the structure is experiencing lateral movement. Failure to address the lateral movement will result in damage to the North Plaza and the Ashlar Seawall, even after the proposed underpinning of the seawall is completed. This information was added to the PreDesign document. - SEI
3	Page 9, Part 4	Expand this discussion to include a brief description of why separate solutions are necessary to address the movement of the Seawall and North Plaza, respectively. Explain briefly why addressing only one of these elements may not address the other, or why addressing only one of these elements may not be prudent.	Information obtained during the "Investigation of Settlement and Upheaval at the Jefferson Memorial", shows that the Ashlar Seawall is experiencing settlement and probable failure of the timber piles supporting it. It is imperative that the seawall be underpinned in order to prevent collapse of the wall. Please see comment above for additional information. - SEI

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PROJECT SPECIALIST**REVIEWER:** D.Denk

4	Page 9, Part 4	The last sentence in this part states that additional monitoring data is required. Will this requirement be met through the additional monitoring to be performed under this PD-SD task order (see Part 5, 5, b & c), or is a need for additional monitoring or a different type of monitoring being stated here? Please clarify and address.	Please see Response to Comment #2, Structural Engineering. The Predesign task for this project includes quarterly monitoring of 22 survey monitoring points, and quarterly readings of the ground water wells, inclinometers, piezometers, tiltmeters, and measurements at joint locations. However, it does not include additional piezometer installation at varying depths as recommended in the "Investigation of Settlement and Upheaval at the Jefferson Memorial" dated 1/30/08. - SEI
5	Pages 5-6	Describe the cracking of the exposed aggregate concrete topping course (believed by the Park to be due to the fact that this course is very thin on the north side of the North Plaza) evident in several locations on the north side of the North Plaza.	Cracking of the exposed aggregate concrete topping course appears to be the result of insufficient thickness of the topping slab over the top fo the grade beams. This deficiency will be taken into consideration and all efforts will be made to mitigate future cracking to the greatest extent possible in the design of the new topping slab for the North Plaza. - HNTB
6	Pages 18 & 23	Indicate if this work would necessitate removal and replacement of existing in-slab light fixtures in the north side of the North Plaza.	The North Plaza remediation method provided in the Predesign documents requires demolition of the entire North Plaza slab, including the removal of the in-slab light fixtures. Two additional remediation alternatives are being developed and include varying amounts of slab removal and replacement, and therefore may or may not affect the in-slab light fixtures. - SEI
7	Page 20 & 26	Do these estimates include replacement of the North Plaza exposed aggregate topping/finish course? If not, please add this item to these estimates.	The estimates have been revised to include the exposed aggregate topping/finish course. - SEI
8	Page 20 & 26	Do these estimates include removal, storage, and reinstallation of the granite features of the North Plaza that will be disturbed? If not, please add this item to these estimates.	The estimates have been revised to include removal, storage, and reinstallation of the granite features of the North Plaza that will be disturbed. - SEI
9		[End of Comments]	

DENVER SERVICE CENTER
Quality Assurance

NAMA 128232

PROJECT MANAGER

REVIEWER: Patrick Macdonald

DATE REVIEWED: 2/22/2008

NO.	DWG or SPEC SECTION	QUALITY ASSURANCE COMMENT	RESPONSE
1	Page 2	Describe extent of rip rap fronting seawall and confirm if this is considered an historic feature.	NPS File No. 808_20013, provided as one of the documents for the "Investigation of Settlement and Upheaval at the Jefferson Memorial", shows the Ashlar Seawall on a pile foundation with rip rap directly beneath it. This plan is dated July 9, 1940. Per phone conversation with Perry Wheelock, the riprap itself is not historic, but the design should work around it and the final solution should result in the overall wall retaining its historic appearance. - SEI
2	Page 3	Please indicate location of West Terrace walk on this plan.	This information was added to the Predesign document. - SEI
3	Page 5	Discuss in more detail the scope (and intent) of the 1969-70 project. Describe intent of this project to represent the original site design for this area by introducing flush granite "curb / edging" and two different color exposed aggregate concrete mixes to represent original roadway and pedestrian site features.	This information was added to the Predesign document. - SEI
4	Pages 5 - 6	Please indicate that plaza historically lacked a railing along seawall.	This information was added to the Predesign document. - SEI
5	Pages 5 - 6	Describe non-historic light fixtures set into plaza pavement and document that (per NPS recollection) the purpose of this lighting is to serve as a warning / announcement of the nearby edge of seawall.	This information was added to the Predesign document. - SEI
6	Page 6, Paragraph 2	Elaborate on difference between existing NW stair and walkway layout and original layout.	Although the Northwest Stairs and walkway have been demolished and rebuilt at least one time since their original construction, the layout and location closely match. The repairs were necessitated by differential settlement and at the time of their completion, restored the stairs and walkway to elevations matching the adjacent Memorial features. This information was added to the Predesign document. - SEI

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PROJECT MANAGER

REVIEWER: Patrick Macdonald

7	Page 8	Please clarify - Does differential settlement at West Terrace walk occur at interface between pile supported pavement and a slab on grade?	The foundation plans for the Jefferson Memorial indicate that the structure is pile-supported from the center of the Memorial to the extents of the Terrace Wall. (Refer to Figure 1, Jefferson Memorial Foundation Types.) Therefore, the West Terrace Walk can be presumed to be pile-supported. This information was added to the Predesign document. - SEI
8	Pages 8 - 9	Paragraph 2 - Elaborate on how differential settlement impacts compliance with ADA requirements.	Differential settlement can dramatically impact ADA accessibility compliance. The ADA guidelines state: 4.5.2 Changes in Level. Changes in level up to 1/4 in (6 mm) may be vertical and without edge treatment (see Fig. 7(c)). Changes in level between 1/4 in and 1/2 in (6 mm and 13 mm) shall be beveled with a slope no greater than 1:2 (see Fig. 7(d)). Changes in level greater than 1/2 in (13 mm) shall be accomplished by means of a ramp that complies with 4.7 or 4.8. 4.8.2* Slope and Rise. The least possible slope shall be used for any ramp. The maximum slope of a ramp in new construction shall be 1:12. The maximum rise for any run shall be 30 in (760 mm) (see Fig. 16). Curb ramps and ramps to be constructed on existing sites or in existing buildings or facilities may have slopes and rises as allowed in 4.1.6(3)(a) if space limitations prohibit the use of a 1:12 slope or less. - HNTB
9	Page 8 - 9	Please indicate that the differential settlement of pavement areas, if not addressed by methods similar to those presently employed by the park's maintenance staff, will result in tripping hazards and represent a significant risk to the NPS due to the likelihood that they will result in tort claims.	The differential settlement which has been observed at the Jefferson Memorial site are very likely to continue if not addressed with a permanent solution. The current solutions implemented by the NPS are generally sufficient to mitigate ADA accessibility concerns, but without constant observation of the conditions and continual repair and replacement of the temporary asphalt ramps, it is highly likely that ADA accessibility would not be maintained and significant tripping hazards would result. - HNTB

PROJECT MANAGER**REVIEWER:**

Patrick Macdonald

10	Page 8 - 9	Describe the risks to the plaza and seawall structural features assuming continued vertical and lateral movement.	Information obtained during the "Investigation of Settlement and Upheaval at the Jefferson Memorial", shows that the Ashlar Seawall is experiencing settlement and probable failure of the timber piles supporting it. It is imperative that the seawall be underpinned in order to prevent collapse of the wall. Opening of joints on the North Plaza indicate that the structure is experiencing lateral movement. Failure to address the lateral movement will result in potential damage to the North Plaza and the Ashlar Seawall, even after the proposed underpinning of the seawall is completed. This information was added to the PreDesign document. - SEI
11	Page 16	Please confirm with NAMA (Wheelock) that North Plaza is an historic structure as indicated on Key index.	From P. Wheelock's comment # 16: "The seawall, plaza and walks are structural elements in the Memorial's cultural landscape. The seawall is historic, the plaza, walks and northwest stair are not original (historic), but when they were last rehabilitated the historic character of the original circulation patterns were respected." This information was added to the Predesign document.
12	Pages 20, 26, 33	Historic Factor should only be applied to the work in this project affecting the seawall capstone and ashlar facing stone.	Historic Factors have been revised based on comments in EST review. - SEI
13	Pages 20, 26, 33	Contracting Method Adjustment should reflect a "Full and Open" solicitation.	See response to Comment 6 on EST tab. - SEI
14	Page 23	Do the proposed new grade beams need to be arced? Would chorded grade beams suffice and result in a cost savings?	More than one configuration is possible for the proposed grade beams, but it is not likely to result in a major cost savings. - SEI
15	Page 38	Ellis Island Seawall project still on-going. Please revise the "year completed" date to 2008.	The data shown for Ellis Island in the Cost Comparability Analysis was taken from seawall segments that were completed in 2007. - SEI
16	Page 45	Response to Question 3 incomplete. The Scope and Cost Validation Form will be a stand alone document submitted to WASO so please provide the "description(s) and Class C Construction Cost" information requested under this question.	The Scope and Cost Validation Form has been revised. See Form. - SEI

PROJECT MANAGER

REVIEWER: Patrick Macdonald

17	Page 46	Response to Question 4 should be revised following adjustments to Construction Cost Estimates per other comments above. Following these adjustments, please indicate extent of NW and NE Stair and Terrace Walk repairs that can fit into the project budget.	The Scope and Cost Validation Form has been revised. See Form. - SEI
18		[end of comments]	

**DENVER SERVICE CENTER
Quality Assurance**

NAMA 128232

PARK

REVIEWER: Steve Sims (SS), Jorge Alvarez (JA), Perry Wheelock (PW), Steve Lorenzetti (SL), Tony Ashdown (TA)

DATE REVIEWED:

NO.	DWG or SPEC SECTION	QUALITY ASSURANCE COMMENT	RESPONSE
1	Page 15	Correct the scale of the legend hatching to the scale of the hatching on the drawing so they are the same.	This has been corrected. - SEI
2	Page 17	What is the basis for deciding which alternative to estimate? How does the NPS 'validate' the cost validation without a decision on which alternative to use?	[NPS DSC will address this comment. - NPS DSC D&C]
3	Page 18	Does the option chosen resist lateral movement?	The lateral movement is addressed through the alternative for the North Plaza remediation. - SEI
4	Page 20	How can we adjust the contracting method adjustment to reflect the NPS's plan? Is this project suitable for Design-Build?	Per NPS DSC, this is to be a "Full and Open" solicitation. - SEI
5	Page 23	Does the North Plaza option completely abandon the existing pile system? Is it necessary to install all new piles, caps and plaza? Aren't there soil anchoring methods that we could use with the existing foundation system to resist lateral movement?	The North Plaza option is a structural retrofit and supplements the existing pile system. For this option, new piles and grade beams are necessary, and their installation requires the removal and replacement of the North Plaza slab. Two additional remediation alternatives are being developed and include varying amounts of slab removal and replacement. - SEI
6	Pages 27-28	Why does this alternative rely solely on H-piles, whereas the seawall depends solely on micropiles. I still do not understand how the use of one pile over the other is being decided. Don't both structures need to resist vertical and lateral movement?	For the Predesign documents, Schnabel was directed to provide the worst case scenario for remediation of the North Plaza, which was determined to be a full structural retrofit. Two additional remediation alternatives are being developed. We are also developing four additional remediation schemes for the Ashlar Seawall. - SEI
7	Page 33	This estimate is nearly double the cost provided with the Investigate report. Why?	The new cost estimate considers pre condition survey, vibration monitoring instrumentation, test pile installation and load testing and an increased footage of micropiles, which are an increase to the previous estimate in the Investigative Report. Also, these estimates were prepared by different firms.

Page 67

PARK

REVIEWER: Steve Sims (SS), Jorge Alvarez (JA), Perry Wheelock (PW), Steve Lorenzetti (SL), Tony Ashdown (TA)

8	Page 34	How was the 10 foot dimension of the transition slab derived? Consider lengthening the transition slab to 20-30 feet with a few transition joints to allow more movement over a longer span.	This 10 foot dimension is a conceptual design and may be modified when the selected alternative is further developed. - SEI
9	Page 35	Can we re-use the existing pile cap instead of installing the micropiles and new pile cap?	The North Plaza alternative presented in the Predesign documents requires a new pile configuration and new pile caps. Other North Plaza alternatives consider the existing cap. - SEI
10	Page 37	Are the costs being used for the projects 'final' as-constructed costs? If not, shouldn't we compare the estimated cost of the Jefferson Memorial project with as-built cost data for an accurate comparison?	The information for "NJTA Pile Rehabilitation Maintenance" and "Children's Hospital Addition" shown in the Cost Comparability Analysis are as-built costs. The costs for "Ellis Island Seawall Repair" are as-bid. - SEI
11	Page 37	What is the basis for deciding which alternative to estimate? How does the NPS 'validate' the cost validation without a decision on which alternative to use?	The project's tight schedule did not permit the A/E to prepare a Class C Cost Estimate for all alternatives to be evaluated at the Value Analysis meeting by the due date of this report. These estimates are currently being developed and will be available for the VA exercise. A revised (Final) Scope and Cost Validation form will be prepared following the VA study that reflects the Preferred Alternatives selected during the VA study. - NPS DSC D&C
12	Page 43	Paragraph 2, 2nd sentence. How should the North Plaza be addressed in greater detail?	This sentence is a general comment with more detail provided on pages 44 and 45 of the Predesign document. - SEI
13	Page 46	Is it a true statement that the North Plaza movement cannot be arrested by repairs on the seawall alone and that both the plaza and the seawall must be stabilized/repared? Should the plaza be stabilized laterally to protect the new work at the seawall? Can the existing north plaza resist lateral movement?	Yes, the opening of joints on the North Plaza indicate that the structure is experiencing lateral movement. Failure to address the lateral movement will result in damage to the North Plaza and the Ashlar Seawall, even after the proposed underpinning of the seawall is completed. This information was added to the Predesign document. - SEI
14		[Note: All above Comments #1 - #13 from S. Sims.]	
15	Page 2	First Paragraph, 2nd to last sentence: "This Project Program identifies the elements <i>around</i> the Memorial..."	This has been corrected. - SEI

Page 68

PARK

REVIEWER: Steve Sims (SS), Jorge Alvarez (JA), Perry Wheelock (PW), Steve Lorenzetti (SL), Tony Ashdown (TA)

16	Page 9	Section 4 - last third of first PP - not clear if you are referring to a yet to be proposed rehabilitation design or to the original design of the Memorial and its surrounding landscape. The seawall, plaza and walks are structural elements in the Memorial's cultural landscape. The seawall is historic, the plaza, walks and northwest stair are not original (historic), but when they were last rehabilitated the historic character of the original circulation patterns were respected.	This information was added to the Predesign document. - SEI
17		[Note: Above two comments #15 & #16 from P. Wheelock.]	

If comments go beyond this row, the sheet must be reformatted in order to print the additional lines.