



Smithsonian Institution

September 29, 2017

Marcel Acosta, Executive Director
National Capital Planning Commission
401 9th Street NW
North Lobby, Suite 500
Washington, DC 02576

Dear Mr. Acosta:

Please include our project, *Smithsonian National Air and Space Museum –Envelope and HVAC Revitalization* on your commission's agenda for November 2, 2017. We request this proposal be reviewed as a revised concept submission for the design of the terraces, landscape and vestibules.

As you are aware, we are close to completing the Section 106 and NEPA processes with NCPC as the co-lead and lead agency respectively. We expect to return for a combined Preliminary and Final approval of the project in January or February.

The Architect for the project, Quinn Evans Architect, is separately delivering the project reports and the electronic file.

If you have any questions concerning this submission, please call Jane Passman at 202.633.6549.

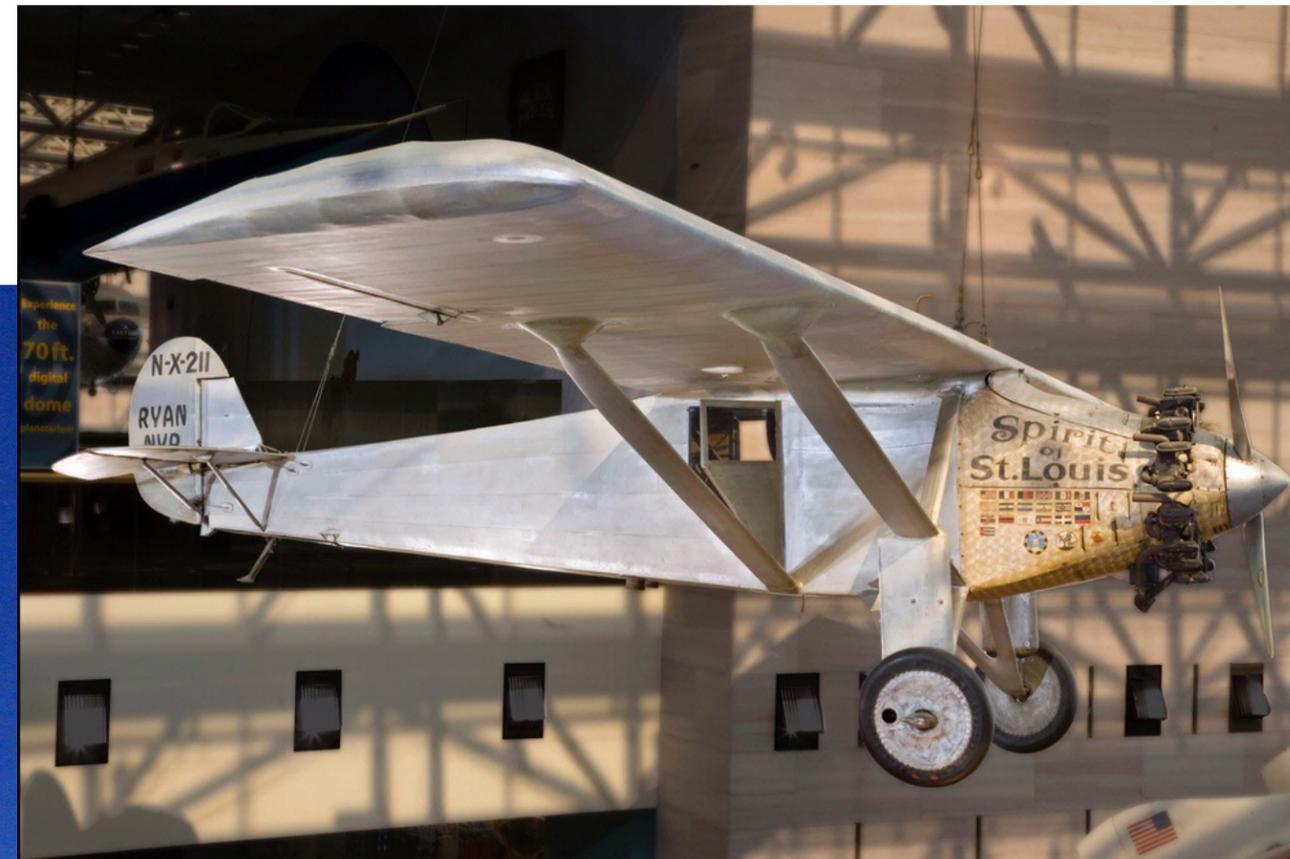
Sincerely,

A handwritten signature in blue ink, appearing to read "A. Trowbridge".

Ann Trowbridge, AIA
Associate Director for Planning

cc: John R. Dailey, Director, Smithsonian National Air and Space Museum
Rick Flansburg, Deputy Associate Director, National Air and Space Museum
Nancy Bechtol, Director, Smithsonian Facilities
Walt Ennaco, Deputy Director, Smithsonian Facilities
Debra Nauta-Rodriguez, Deputy Director, Office of Planning, Design and Construction
Sharon Park, Associate Director for Architectural History and Historic Preservation
Charles Obi, Program Manager, Office of Planning, Design and Construction
Michael Henry, Design Manager, Office of Planning, Design and Construction
Jane Passman, Senior Facilities Master Planner, Office of Planning, Design and Construction
Carly Bond, Historic Preservation Specialist, Office of Planning, Design and Construction

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REVISED CONCEPT REPORT Rev.1

National Capital Planning Commission
29 September 2017

Smithsonian's National Air and Space Museum
National Mall Building
Envelope and HVAC Revitalization

SF Project No. 1206101
QEA Project No. 31301800



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REVISED CONCEPT REPORT





PROJECT NAME

National Mall Building Envelope and HVAC Revitalization

LOCATION

Smithsonian Institution
National Air and Space Museum
Washington, DC

AGENCY AND CONTACT

Smithsonian Institution
Smithsonian Facilities (SF)
Office of Planning, Design and Construction (OPDC)
Capital Gallery
600 Maryland Avenue SW Suite 5001
MRC 511, PO Box 37012
Washington, DC 20013-7012

Jane Passman, Senior Facilities Master Planner
Phone: 202.633.6549
Email: passmj@si.edu



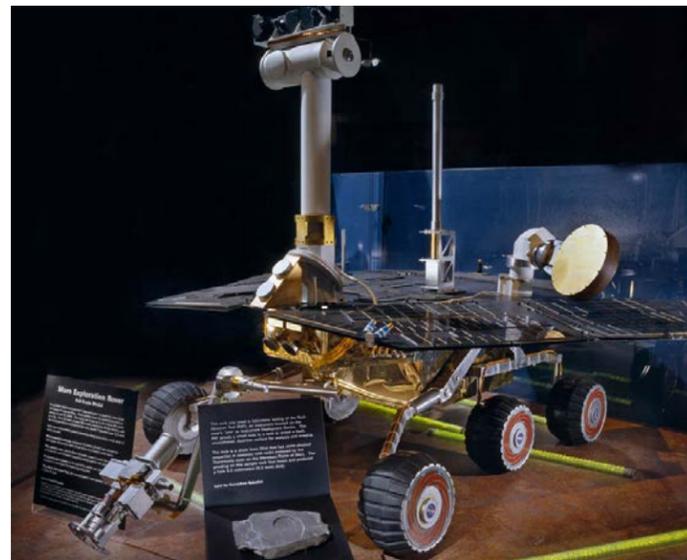


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INTRODUCTION



National Air and Space Museum Mall Building Revitalization



The Smithsonian Institution has further developed the proposed design of the NASM Mall Building Revitalization to reconcile the overall project scope and budget. This report documents these updates with the following revisions:

- Reduced extent of revisions to the existing terrace layout
- Removal of the proposed fountain from the proposed plinth for the Delta Solar sculpture at the west terrace
- Omission of the proposed canopy at the south entrance
- Deletion of the photovoltaic panel array proposed for the main roof

The remainder of the report consists of updates that were developed within the scope of the previously proposed design, including the planting plan, stormwater management, and north vestibule canopy.

The report is comprised of four primary components. The front end addresses existing conditions and project objectives. The site design and planting plan developments are documented in the second section. This is followed with an update to the vestibule scope. Previous versions of the proposed designs are documented in the appendices as located at the end of the report.

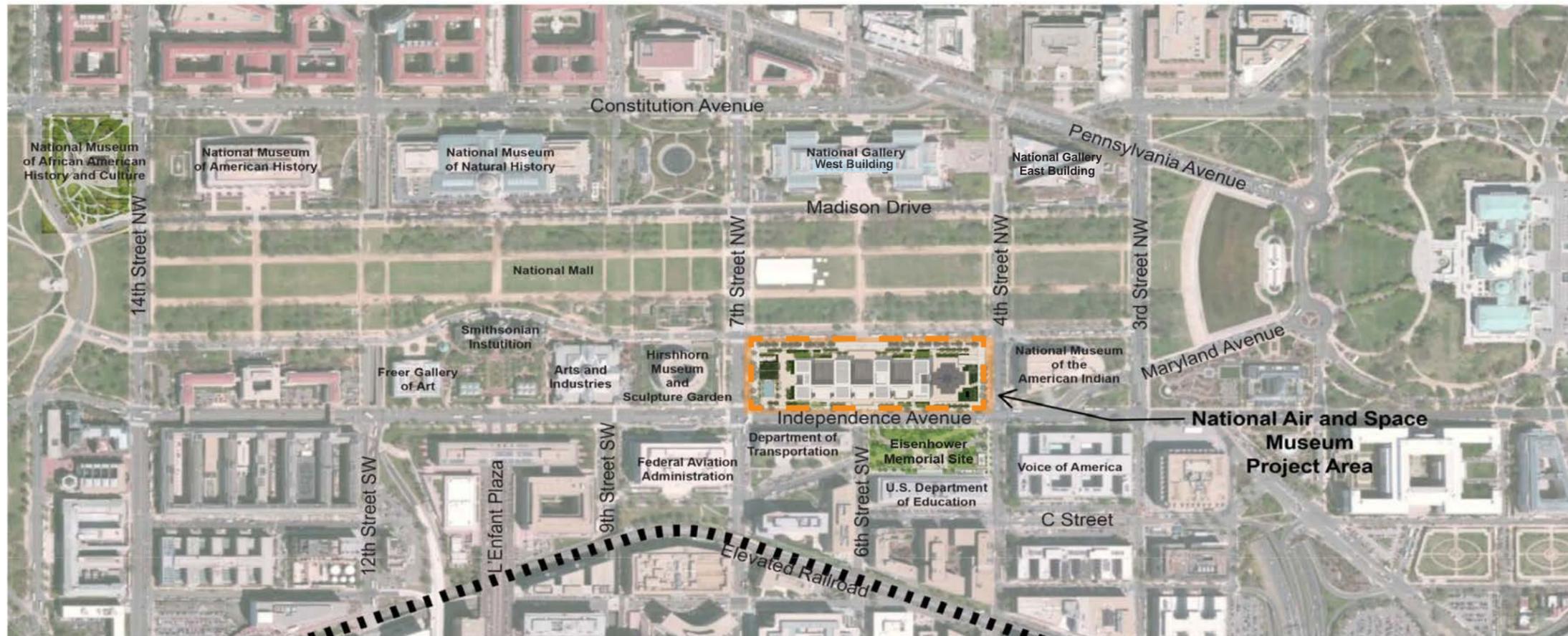
NASM Vision: “Transforming NASM for the future”

The Smithsonian’s National Air and Space Museum will assess and improve our programs, processes, and tools; revitalize our facilities and refresh our exhibitions to better engage and educate the public; preserve and share our collections; and perform original research in planetary science and the history of aviation and space-flight.

**NASM Mission: “Commemorate, Educate, Inspire”**

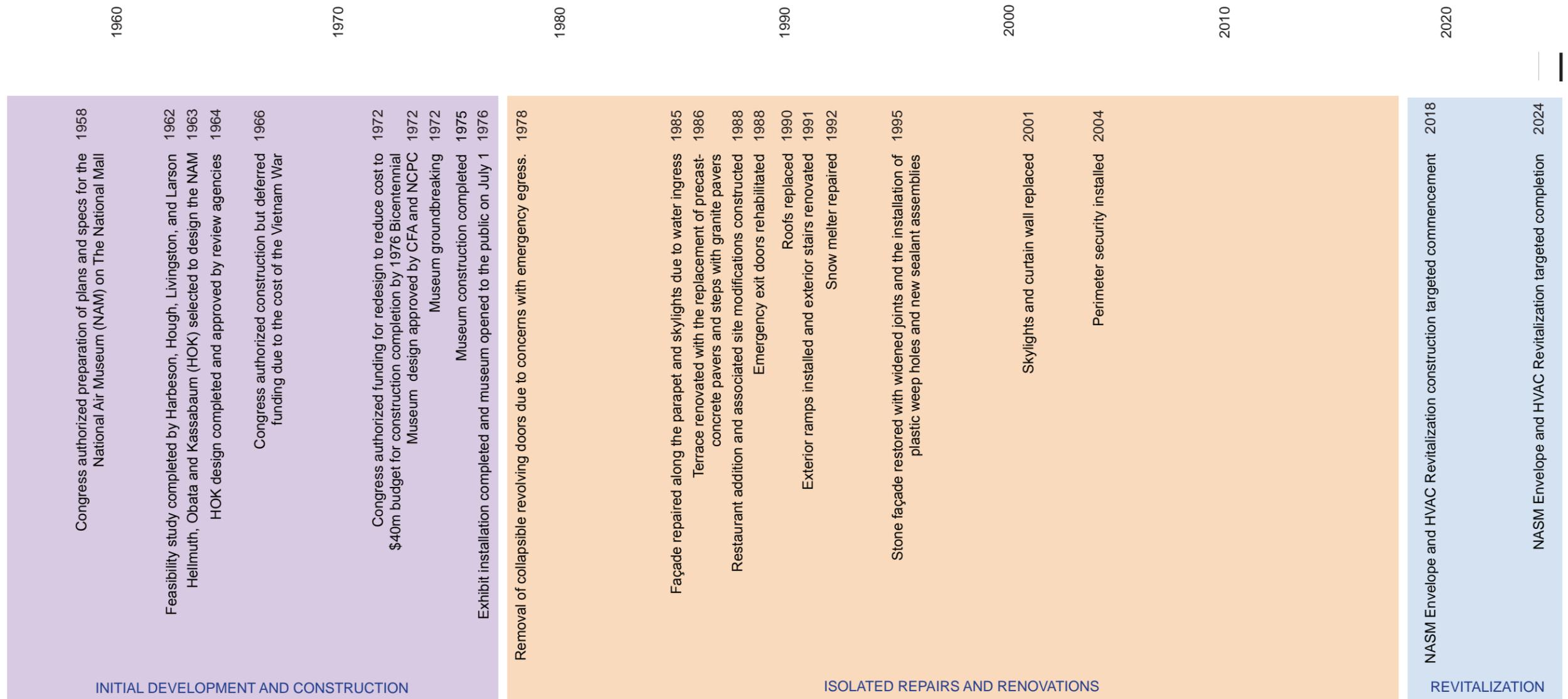
The Smithsonian’s National Air and Space Museum collects, preserves, studies, and exhibits artifacts, archival materials, and works of art related to the history, culture, and science of aviation and spaceflight and the study of the universe. Its research and outreach activities serve all audiences, within and beyond its walls. The Museum commemorates the past and is committed to educating and inspiring people to foster appreciation for the importance of flight to humanity.

**Museum Vision and Mission**



National Air and Space Museum Mall Building - Context Map





Early Proposal to Review Agencies in 1972



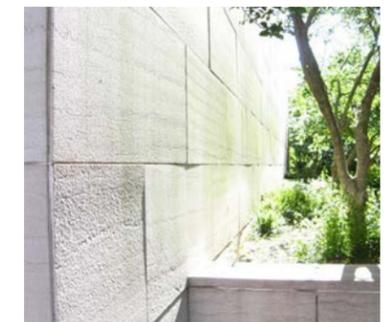
Grand Opening 1976



Restaurant Addition 1988



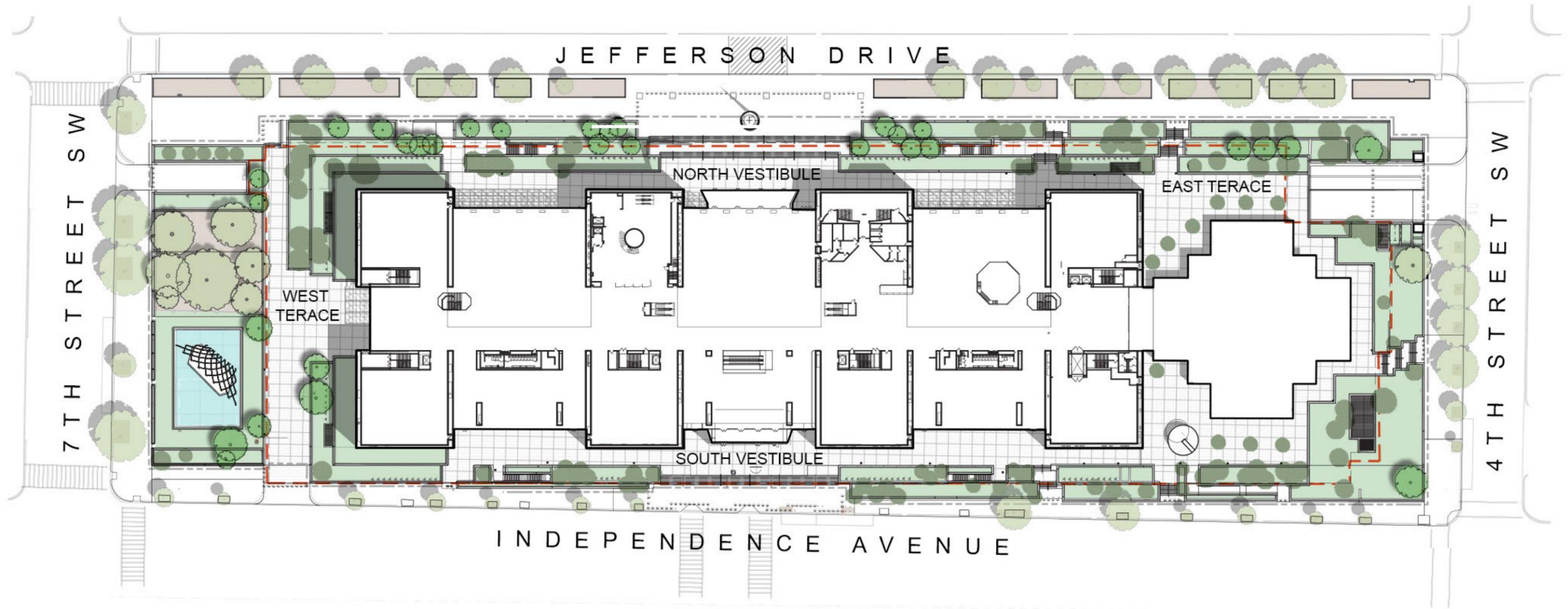
Perimeter Security 2004



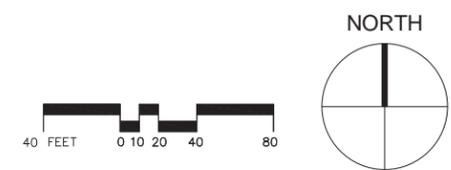
Proposed Revitalization 2024

National Mall Building Development Timeline





Existing Site Plan and First Floor Plan





Existing North Elevation

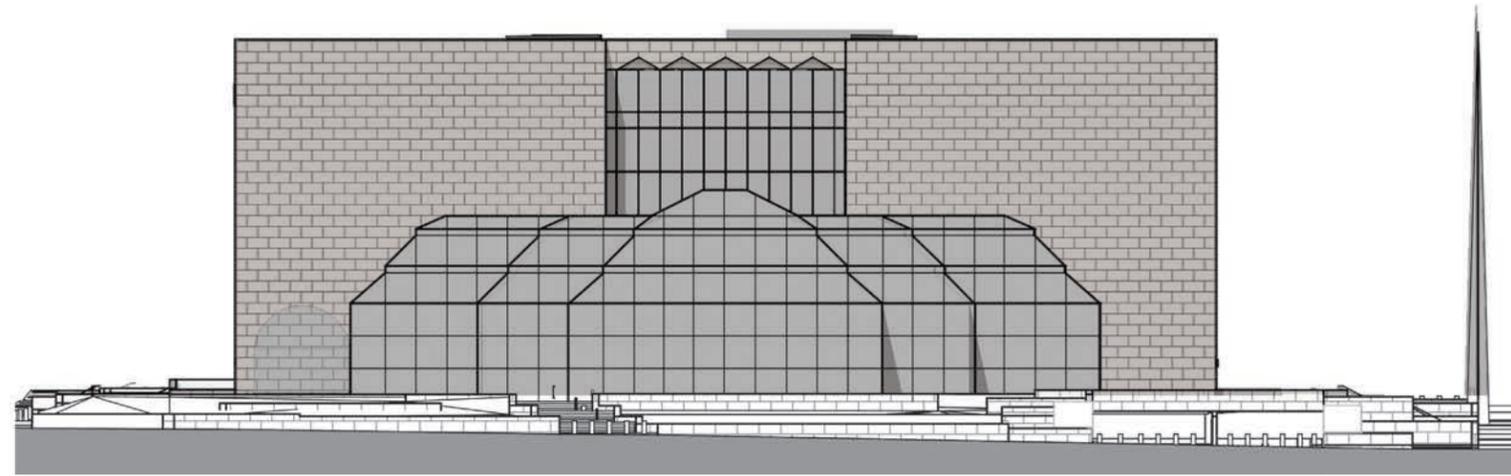


Existing South Elevation



Existing Elevations



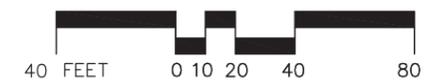


Existing East Elevation



Existing West Elevation

Existing Elevations



1.1 PROJECT DATA

Project Area & Building Area

The project comprises the renovation and restoration of the existing 687,000 gsf (63,824 m²) National Air and Space Museum (NASM) National Mall Building, including 112,000 gsf (10,405 m²) terrace revitalization. The overall site area is 448,530 gsf (41,670 m²). The cladding replacement includes 160,600 gsf (14,920 m²) stone facade, 40,000 gsf (3,716 m²) curtain wall, 52,000 gsf (4,830 m²) skylight, and 70,000 gsf (6,503 m²) roof. The proposed vestibule additions are a combined 4,800 gsf (446 m²).

Assigned Employment

There is a combined total of approximately 530 employees and volunteers assigned to the NASM Mall Building. No change of assigned employees is envisioned as a result of this project.

Schedule

The project is scheduled to be constructed beginning in early 2018 with an estimated six year period of construction. Public access to the Museum will be maintained but restricted while under construction.

Project Cost and Funding

Federal funding for revitalization is expected to be requested in increments over FY18-FY22.

1.2 PROJECT NARRATIVE

The proposed design for the National Mall Building envelope and HVAC revitalization addresses the need for upgrades to a facility with out-of-date systems and significant deferred maintenance. The project objectives include the following goals:

- The revitalization of the museum to protect its mission for a century or more to come.
- The replacement of the currently failing Tennessee marble clad envelope with a material that is compatible with the original design of the building, has a life span of 100 years with proper maintenance, and meets requirements for energy performance and insulation.
- Select materials and systems that accommodate the project schedule and cost without increasing risk
- Maintain eligibility of the museum to be added to the National Register of Historic Places
- The replacement of currently outdated utility systems with upgrades that are to be designed and selected to endure for prolonged service timespans, maintainable and serviceable without major renovations.
- The enhancement of the visitor experience with greater accessibility and amenities.

Development History

The Smithsonian's aeronautical collection was established in 1876 with a group of kites acquired from the Chinese Imperial Commission. In 1946, Congress established a National Air Museum to memorialize the national development of aviation. In 1966, the name of the museum was changed to the National Air and Space Museum to memorialize the development of both aviation and spaceflight. In 1971, Congress passed a funding measure for \$40 million toward the new building.

NASM became an important beacon of cultural and technological innovation in Washington, D.C. when it was added to the promenade of the National Mall in 1976. With the largest collection of historic aircraft and spacecraft in the world, the design of this museum offered both unique architectural opportunities and complex challenges.

In 1965, Hellmuth Obata and Kassabaum Architects (HOK) was commissioned to design the museum and surrounding landscape by the GSA, who at that time managed design and construction of Smithsonian facilities. Lead Architect Gyo Obata aspired to design a building that was in harmony with the character of the National Mall and reflected the architectural elements of the surrounding buildings, while also pursuing modern architectural principles. Through several iterations, Obata explored design ideas including the way the building meets the ground, attention to scale, the interplay between solids and voids, and the relationship to the surrounding buildings on the Mall.

Obata's solution was skillfully simple: four large marble-clad pavilions, separated by three recessed steel-and-glass atria. Drawing inspiration from neighboring buildings, primarily the National Gallery, Obata reflected formal massing and materials in his design. The alternation of solids and voids are placed and proportioned to respond to corresponding projections and recesses of the West Building of the National Gallery, which sits directly across the Mall. Equivalent volumes face Independence Avenue, but the recessed glass-enclosed bays of the Mall façade have been replaced by floating marble cubes, cantilevered to be flush with the south façade. The volumes are clad in Tennessee Pink marble, as used in the construction of its neoclassical predecessor.

In 1972, the design was approved by the federal review commissions after several revisions, as GSA oversaw the design of SI facilities at that time. Construction began later that year. The museum was opened on July 1, 1976. With this, the project requirements were accomplished by opening in time for the

Bicentennial and within the \$40 million construction budget. The project was awarded with the "anti-golden fleece" prize by Senator William Proxmire in honor of this feat.

The popularity of the museum brought more visitors than anticipated, creating increased impact on certain building systems. The weathering of the building was also accelerated by the limited longevity of certain building components that were downgraded as part of the original construction in order to reduce cost and meet the budget.

The initial building system repairs and replacements began in 1978 with the replacement of the collapsible revolving doors due to concerns regarding emergency egress. Later renovations included the replacement of precast concrete exterior pavers with granite in 1985. The acrylic skylights, which were introduced as a value engineering substitution for the glass enclosure originally proposed, were replaced in glass in 2001 as part of glazing replacement that included the curtain wall and vestibule as well.

The envelope and HVAC studies conducted by Quinn Evans Architects in 2013 determined the stone cladding system is failing, as well as the HVAC systems, which have reached the end of their usable life. Due to the integration of the exterior cladding with the mechanical air distribution system, it is necessary to undertake these upgrades together. Further analysis established that the waterproofing enclosure of the plaza and the main roof are similarly aging and beyond their projected life span.

Historic Preservation

NASM is identified as a contributing building to The National Mall, which was listed on the National Register of Historic Places in 1966 as an historic site. NASM is not currently listed individually on the National Register of Historic Places or the District of Columbia Inventory of Historic Sites. However it is potentially eligible for individual listing. A Determination of Eligibility study for NASM has been initiated by the Smithsonian. At the time of this report the building is 41 years old.

Project Data and Narrative



2.0 TRANSPORTATION MANAGEMENT PROGRAM

Not applicable to this project because the assigned employees are below 500.

3.0 ENVIRONMENTAL DOCUMENTATION

NEPA Compliance

In accordance with the National Environmental Policy Act of 1969, the Smithsonian Institution has initiated an Environmental Assessment study for the National Air and Space Museum with public and agency scoping meetings having been conducted. NCPC serves as the Lead Federal Agency for this NEPA process. The NEPA scoping meeting was conducted on 12 November 2014. The Draft Environmental Assessment was issued on March 31, 2017. The Environmental Assessment public review period concluded on 1 May 2017.

4.0 HISTORIC PRESERVATION DOCUMENTATION

Compliance

Refer to adjacent letter from the SI office of Architectural History and Historic Preservation that formally initiates the Section 106 process for this project on 3 September 2014. Four meetings with consulting parties have been conducted to date. Additional consultation will be conducted as needed in the future.

5.0 FLOOD PLAINS MANAGEMENT AND WETLANDS PROTECTION

Located Within Floodplain, No Impact on Wetlands

The north and east portions of the site are within the 100-year (1% annual chance) flood plain as designated by FEMA's 2010 map. This flood plain, with Base Flood Elevation (BFE) +/- 12.5 feet, overlaps the east garage ramp, which serves as the entrance to NASM's loading dock. Mitigation will include waterproofing and a flood wall at the garage entrance ramp that accommodates the 100-year flood plain plus 3 feet per Executive Order 13690.

This project does not impact a wetlands area.

Smithsonian Institution

Architectural History and Historic Preservation

3 September 2014

Mr. C. Andrew Lewis
Senior Historic Preservation Specialist
D.C. Historic Preservation Office
1100 4th Street, SW, Suite E650
Washington, D.C. 20024

Dear Mr. Lewis,

The Smithsonian's National Air and Space Museum was dedicated on 4 July 1976, just in time for the Bicentennial of the United States. To meet that deadline, new construction techniques and use of materials were used. These included the use of a thin Tennessee marble panel on a steel frame to create a curtain wall requiring less steel and marble.

Since that time, the marble has failed to the point where it needs to be entirely replaced. The Smithsonian is investigating if the original quarry can be reopened as well as using material that would closely match the original Tennessee marble in keeping with the *Secretary of the Interior's Standards for Treatment of Historic Buildings*.

Pursuant to 36 CFR 800.3(a), the Smithsonian has determined that the proposed replacement of the original Tennessee marble is an undertaking as defined in 800.16(y) and that it has the potential to cause effects on historic properties, in particular, the National Mall, a site listed on the National Register of Historic Places.

The Smithsonian wishes to initiate the Section 106 review process and seeks the assistance of the District of Columbia Historic Preservation Office (DCSHPO) in applying the criteria of adverse effect (800.5) to determine the effect the undertaking will have on historic properties.

The Smithsonian looks forward to working with you on this project, and will ensure that you receive proper documentation.

With kind regards

Amy Ballard
Amy Ballard
Senior Historic Preservation Specialist

cc: Jennifer Hirsch, National Capital Planning Commission

P.O. Box 37012 MRC 511
Washington, D.C. 20013-7012
Tel: 202-633-6535 direct

Project Report, Section 106 Initiation Letter

Smithsonian Institution

Architectural History and Historic Preservation

5 September 2014

Mr. C. Andrew Lewis
Senior Historic Preservation Specialist
D.C. Historic Preservation Office
1100 4th Street, SW, Suite E650
Washington, D.C. 20024

Dear Mr. Lewis,

The Smithsonian's National Air and Space Museum is one of the most highly visited museums in the world. Since September 11, 2001 the threat level has increased to the museum, and security was elevated upon entering the museum. These security measures consist of magnetometers and x ray machines manned by security officers.

Presently the security screening is conducted just as one enters the museum at the north and south entry points. In the summer and during school holidays, this creates long lines outside the museum and overcrowding inside. During inclement weather there is no place for visitors to shelter. Moreover there is no transition point between the security screening and the museum.

Pursuant to 36 CFR 800.3(a), the Smithsonian has determined that the proposed addition of security pavilions on the north and south entries to the National Air and Space Museum is an undertaking as defined in 800.16(y) and that it has the potential to cause effects on historic properties, in particular, the National Mall, a site listed on the National Register of Historic Places.

The Smithsonian wishes to initiate the Section 106 review process and seeks the assistance of the District of Columbia Historic Preservation Office (DCSHPO) in applying the criteria of adverse effect (800.5) to determine the effect the undertaking will have on historic properties.

The Smithsonian looks forward to working with you on this project, and will ensure that you receive proper documentation.

With kind regards

Amy Ballard
Amy Ballard
Senior Historic Preservation Specialist

cc: Jennifer Hirsch, National Capital Planning Commission

P.O. Box 37012 MRC 511
Washington, D.C. 20013-7012
Tel: 202-633-6535 direct

GOVERNMENT OF THE DISTRICT OF COLUMBIA
STATE HISTORIC PRESERVATION OFFICER



October 3, 2014

Ms. Amy Ballard, Senior Historic Preservation Specialist
Smithsonian Institution
Architectural History and Historic Preservation
P.O. Box 37012 MRC 511
Washington, DC 20013-7012

RE: Initiation of Section 106 Consultation; National Museum of Air & Space Façade Replacement Project

Dear Ms. Ballard:

Thank you for formally initiating consultation with the District of Columbia State Historic Preservation Officer (SHPO) regarding the above-referenced undertaking. We are writing in accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, to provide our initial comments regarding effects on historic properties.

As you are aware, the National Air & Space Museum is a contributing element of the National Register of Historic Places-listed National Mall Historic District. Based upon our review of the project submittal and our participation in the site visit and informal discussions held on June 17th and September 22nd of this year, we understand that the original, Tennessee marble panels that make up the exterior façades – and the museum's most prominent character-defining feature – are failing to the point that they must be completely replaced. Repair/reuse of the original marble is not an option because the panels are very thin and much of the deterioration consists of significant warping. However, we are encouraged that the Smithsonian Institution is actively investigating the possibility of reopening the original quarry and acquiring matching stone to complete the project. Since this approach has the potential to completely avoid adverse effects, we strongly encourage *in-kind* replacement if at all possible. Alternative materials such as granite, metal or synthetic panels are likely to result in adverse effects on the museum and the surrounding historic district.

Please keep us posted as more is learned about the possibility of obtaining matching marble panels. In the meantime, we look forward to continuing consultation with the Smithsonian Institution and other parties, including assisting in the preparation of an Area of Potential Effect (APE) and an initial list of potential consulting parties. If you should have any questions or comments regarding this matter, please contact me at andrew.lewis@dc.gov or 202-442-8841. Otherwise, thank you for providing this initial opportunity to comment.

Sincerely,

Andrew Lewis
C. Andrew Lewis
Senior Historic Preservation Specialist
DC State Historic Preservation Office

14-433
cc: Jennifer Hirsch, NCPIC

1100 4th Street, SW, Suite E650, Washington, DC 20024 Phone: 202-442-7600, Fax 202-442-7637

Section 106 Initiation



Smithsonian Institution
National Air and Space Museum

JUNE 2015 COMMISSION OF FINE ARTS CONCEPT HEARING

Following several months of consultation from agency staff, a concept report and presentation was provided in June 2015 of the following scope items for the NASM revitalization project:

- Terrace
- Vestibules
- Envelope Replacement
 - Stone Cladding
 - Glazing
 - Roof Solar Panels
 - Solar Wall

COMMISSION OF FINE ARTS CONCEPT APPROVAL

The concept proposal was granted concept approval for all aspects of the scope, with comments providing direction on how to advance the design. The letter from the Commission of Fine Arts is included on this page for reference. Additional design iterations are included in the appendix, documenting the progress made in developing the design with on-going consultation from agency staff towards the updated concept design proposal documented in this report.

U. S. COMMISSION OF FINE ARTS

ESTABLISHED BY CONGRESS 17 MAY 1910
401 F STREET NW SUITE 312 WASHINGTON DC 20001-2728 202-504-2200 FAX 202-504-2195 WWW.CFA.GOV

26 June 2015

Dear General Dailey:

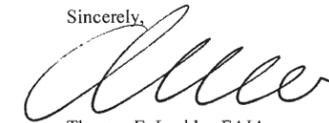
In its meeting of 18 June, the Commission of Fine Arts reviewed the concept proposal for replacing the exterior facades and terraces of the National Air and Space Museum on the National Mall. The Commission approved the concept with numerous comments for further consideration as the design is developed.

In their discussion, the Commission members considered the project's complex issues of historic preservation, building technology, programmatic needs, and interpretive themes. While they noted the obvious competence and care taken by the project team, they suggested that the design could go much further in expressing the technology of the museum's subject of flight and space exploration. While accepting the proposal to reclad the building in the same Tennessee Pink marble used in the original design, they expressed regret that other options for replacing the deteriorating stone panels with more modern materials—such as metal, enamel, ceramic, or glass—were not presented as viable options. They recognized the impetus of the space program in developing such technologies as photovoltaic panels, and they identified the great opportunity in this project to express these innovative technologies in a more comprehensive way in the renovation of the building. Instead of the current proposal to treat new entrance canopies and photovoltaic arrays as unrelated elements added to the reconstructed stone shell of the building, they recommended that these pieces be more fully integrated with each other—and even with the building enclosure panels—transforming the existing architecture to convey the critical role of technology in air and space travel.

For the redesign of the building's landscape, the Commission members expressed strong support for the proposal to simplify and open up the low terraces surrounding the building as these are rebuilt to accommodate modern requirements of accessibility and security. Observing that the site walls are not clearly related to the horizontal aesthetic of the building's plinth, they suggested consideration of lowering where possible the height of planter walls around the site.

The Commission members hope that the opportunity presented by this project to express themes of design and science is explored along with a more conventional preservation approach for this highly popular and prominent museum, and they look forward to further review as the concept is developed. As always, the staff is available to assist you with the next submission.

Sincerely,



Thomas E. Luebke, FAIA
Secretary

Gen. John R. Dailey, Director
National Air and Space Museum
Smithsonian Institution
P.O. Box 37012
Washington, DC 20013-7012

cc: Ann Trowbridge, Smithsonian Institution
Larry Barr, Quinn Evans Architects
Roger Courtenay, AECOM



CFA Concept Approval

Smithsonian Institution
National Air and Space Museum

PREVIOUS NCPC COMMENTS ON CLADDING:

July 2016 Concept Submission of Vestibules and Site Improvements:

(NCPC) "Recommends that the applicant continue to work closely with NCPC, the U.S. Commission of Fine Arts, and the District of Columbia State Historic Preservation Office to identify an appropriate cladding material that meets the performance criteria. If Tennessee Pink Marble, the original stone, is determined to be infeasible, consider ways to achieve a seamless transition between the exterior cladding and the interior stone treatment, and to avoid, minimize, or mitigate adverse effects on the National Air and Space Museum Building and the National Mall Historic District."

PREVIOUS NCPC COMMENTS ON CLADDING:

April 2017 Comments on Informational Briefing and Mockup Site Visit:

Commissioners who visited the mockup in the rain commented during the Informational Briefing on the value of having the mockup to evaluate cladding options but varied in their preferences and dislikes. Several commissioners favored the Ultra High Performance Concrete, several found the Echo Lake Granite to be too busy, and one suggested that Tennessee Pink be considered if technical and cost issues could be resolved. The Commission expressed flexibility regarding manmade vs. natural stone as well as emphasizing the criterion of an inherently beautiful material over that of matching the National Gallery of Art. The Colonial Rose (Lac Du Bonnet) granite was not part of the mockup seen on April 6, 2017.

U.S. COMMISSION OF FINE ARTS

ESTABLISHED BY CONGRESS 17 MAY 1910
401 F STREET NW SUITE 312 WASHINGTON DC 20001-2728 202-504-2200 FAX 202-504-2195 WWW.CFA.GOV

23 June 2016

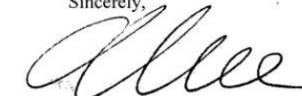
Dear General Dailey:

In its meeting of 16 June, the Commission of Fine Arts reviewed a revised concept design for the replacement of the terraces surrounding the Smithsonian Institution's National Air and Space Museum and for two new visitor screening pavilions, part of a larger project to renovate the museum's exterior. The Commission approved the proposed design for the terraces and provided comments for the designs of the pavilions as they are developed.

The Commission members expressed appreciation for the thorough presentation of a complex project encompassing numerous disparate conditions, and they supported the plan to provide expanded accessibility, to maintain perimeter security, and to increase visitor comfort. They strongly favored the Smithsonian's preferred Scheme A—which would create an enhanced pedestrian environment with larger shade trees and sequence of public spaces—over Scheme B—which would elaborate on the existing logic of terraces and planters in the building yard leading to the museum on a plinth. They suggested further refinement of the details of the freestanding barrier walls that line the pedestrian pathways, such as the potentially awkward end conditions of these walls. For the entrance pavilions, they expressed support for their elegant, curvilinear forms, but noted that full review of the design of the structures requires understanding their relationship to the building's new cladding material.

The Commission looks forward to the next review of this important project, which should include documentation of the proposed exterior cladding. As always, the staff is available to assist you.

Sincerely,



Thomas E. Luebke, FAIA
Secretary

Gen. John Dailey, Director
National Air and Space Museum
Smithsonian Institution
P.O. Box 37012
Washington, DC 20013-7012

cc: Roger Courtenay, AECOM
Larry Barr, Quinn Evans Architects

CFA Concept Approval - July 2016 and April 2017 Comments



National Air and Space Museum Mall Building Revitalization



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SITE DESIGN



Introduction

This submission incorporates changes in design associated with reconciling overall project scope and budget.

Key elements that have been altered since the agency presentations of 2016 include:

1. The planter layout along the north side of the grounds retains existing conditions except for the insertion of the new entrance walkways on either side of the central stair.
2. The northwest corner entrance retains more of the existing layout and planters.
3. The northeast and southeast corners now retain the existing planter layouts – with no direct entrance to the grounds.
4. Planter walls retained maintain their existing height throughout the grounds.
5. The plinth of the Delta Solar sculpture no longer incorporates a water feature.
6. Exposed aggregate concrete is the basic paving material, with stone paving areas incorporated at the north and south entrances and around the base of the Delta Solar sculpture.

Smaller adjustments associated with advancement of the design include:

1. Tree planting layout and spacing has been adjusted (from +/- 30' to +/-45') to provide better conditions for growth and solar access to the groundplane.
2. All existing stairways into the grounds are now retained.
3. Planting, lighting, handrail improvements and site security perimeter have been adjusted to confirm with site design refinements and changes.
4. Storm water management design no longer incorporates catchment of paved areas.

Basis of Design

The terrace of the museum requires renewal. The Museum underground parking and basement extends beyond the main building by about 2/3 of the terrace area. Substantial waterproofing and related failures have been uncovered. As a result all paving, soil, and planter systems are to be removed in order to remedy the situation. Depending on the degree of technical involvement, some of the original structure above the base slab and basement envelope will be retained, in particular elements of the structured secure perimeter. These building envelope issues mean that opportunities

have arisen to address significant museum and grounds concerns such as accessibility and circulation, way-finding, human comfort, soil and plant materials, as well as aesthetic and programmatic design concerns.

Goals and Objectives of Design

There are six primary objectives for the new design being proposed as a part of the rehabilitation of the grounds:

- Provide for adequate waterproofing and structural support for the building and its basement.
- Improve access and its visibility between the museum and the National Mall and surrounding context.
- Create an accessible, welcoming and comfortable environment for visitors.
- Provide for future programming, thematic interpretation and related amenity and enterprise development on the museum grounds, as an integral element of the museum.
- Reinforce the gardens and grounds as an element in the overall design, in scale and appropriate to the museum building.
- Accommodate increased growth in visitation since the Museums' opening in 1976, and anticipate continued growth.

Precedent and Context

A number of architectonic design elements were used in the original HOK design and, in subsequent additions and modifications, by HOK and others. These include: planters and planter wall design; free-standing, parapet and retaining walls, and ramps. These precedents have been retained and applied in the current revised concept design proposal.

The Museum lies on seven acres of grounds between 4th Street SW and 7th Street SW. As envisaged by federal and City (District) planners, 7th Street will reassert an important corridor between the southwest waterfront and the downtown north of the Mall.

The National Air and Space Museum is a key portal to the Smithsonian museums and the National Mall from the south and Independence Avenue.

Site Narrative - Basis of Design



Design Approach

Parti

The design parti for the grounds of the National Air and Space Museum proposes to:

- Preserve the original organizational concept of the grounds;
- Simplify all planting, opening up views over terraces surrounding the building for greater visual accessibility and clarity of design;
- Open the grounds to become a welcoming, fully accessible experience;
- Strengthen desired viewsheds to and from the museum and museum terrace;
- Improve microclimate and human comfort for all visitors with access to increased tree canopy shade; and
- Create an architectonic composition of tree and landscape plantings to complement the scale and rhythm of the museum.
- Focus improvements on the west end and central portions of the grounds, leaving the layout and structures of the east end of the grounds (east of the east end of the museum building) essentially as they currently exist, except for upgrading materials and finishes to coordinate with the rest of the project. This area is a future building project area.

Design Outcome

The resultant revised concept design builds on earlier submissions and comments:

1. Opens, reduces or eliminates planters at the northwest and southwest corners and around the north and south entrances to create clear and intuitive grounds entrance and wayfinding circulation;
2. Provide universal access conditions at entrances to the grounds and to the museum entrances on north and south;
3. Create entrances to the entirety of the museum grounds at the northwest and southwest corners, where none currently exist;
4. Develop complete circulation of the grounds within the property, providing for thematic and museum-related activity on the grounds in the future;
5. Improve visitor physical, tactile and visual approach to plant materials;
 - 5.1 Provide an architectonic massing of shade and small trees that integrates well with the National Mall setting and creates open view relationships between grounds and Mall;
 - 5.2. Add thematic (and low) groundcover planting design

to animate entrances and create interpretive opportunity;

6. Further integrate the prominent 'Delta Solar' fountain at the southwest corner within its respective public realm:
 - 6.1. Relocate the fountain as a more highly visible component of the perimeter positioning it as an important 'signifier' of welcome on the 7th Street corridor, with a 'dry plinth' base;
 - 6.2. Conserves the west memorial grove of willow oak trees, as an integral complement to the open plaza of the 'Delta Solar' setting;
7. Build on two key objectives identified in the NASM Master Plan (Smithsonian Institution, Ayers Saint Gross, 2013):
 - 7.1. The improvement of the general usefulness and integration of museum grounds to the museum mission; and
 - 7.2. The development of a comprehensive thematic and architectonic approach to planting design.

Massing of the building platform

The current grounds, a result of several eras of additions to the original executed design of 1976, consist of a system of design elements that for the most part follows the planter and access point design of the original design. Rectangular planters of varying widths, lengths and heights characterize the landscape setting.

The revised design proposal maintains the existing elevation datum point of the main terrace level, conserving the seating-height precedent elevation of the planter wall which describes the edge of the main terrace paving at the upper level. At the back of sidewalk around the perimeter of the grounds, the existing perimeter secure-height planter wall establishes a second, 'adjusting,' datum elevation. This datum elevation changes from west to east as the topography of the surrounding context drops from an at-grade relationship in varying rates and totals (for example, at the northeast corner grade drops some 2.9 meters (9.5 feet) from terrace to sidewalk). The horizontal planters step down along the back of sidewalk, maintaining at least the minimum secure perimeter height requirement. The planter layout of the proposed (revised) concept design closely follows the existing system, with significant eliminations or re-positioning of planters occurring only at the northwest and southwest corners, where new entrances to the entire grounds and museum building are proposed.

Site Systems

Amenities: An unobstructed, continuous and paved pedestrian loop is provided for visitors' access and service utility vehicles. Wider areas provide for future site furnishing, interpretation, and vendor venues. Public Art (sculpture) and signage elements are keys to way-finding and mission, and locations have been suggested for these elements.

Site furnishing: A simple, contemporary, metal-based palette composed of benches, bike racks, and litter receptacles is under development.

Perimeter security: Little change in the layout of the perimeter is anticipated. The underlying structural components will be retained and re-integrated with the new work whenever possible.

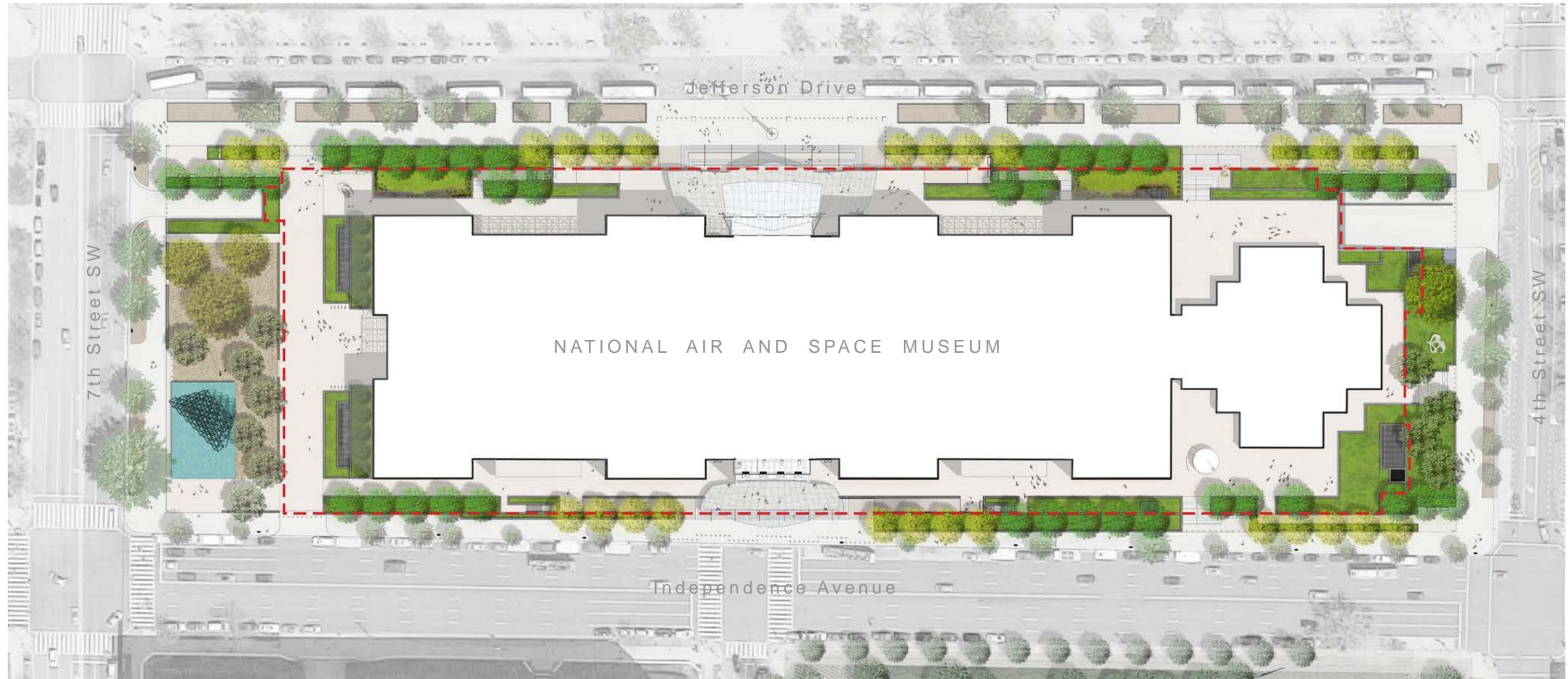
Storm water management: Water conservation is a fundamental issue for the museum. The site permeability is limited by the building below grade structure and its extent. The entire roof and paved terrace areas storm water run-off will be collected for re-use via on-site underground storage cisterns. Storm water falling on planted areas will be collected into root zones and available to plants. All planted areas of the site will be irrigated.

Prior Design Development Studies

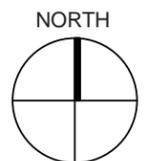
An appendix of design studies of planter massing and layout, and related conditions, is provided for reference. These studies have been a significant element in meetings and discussions with CFA, NCPC and SHPO staff since June of 2015.

Site Narrative - Design Approach





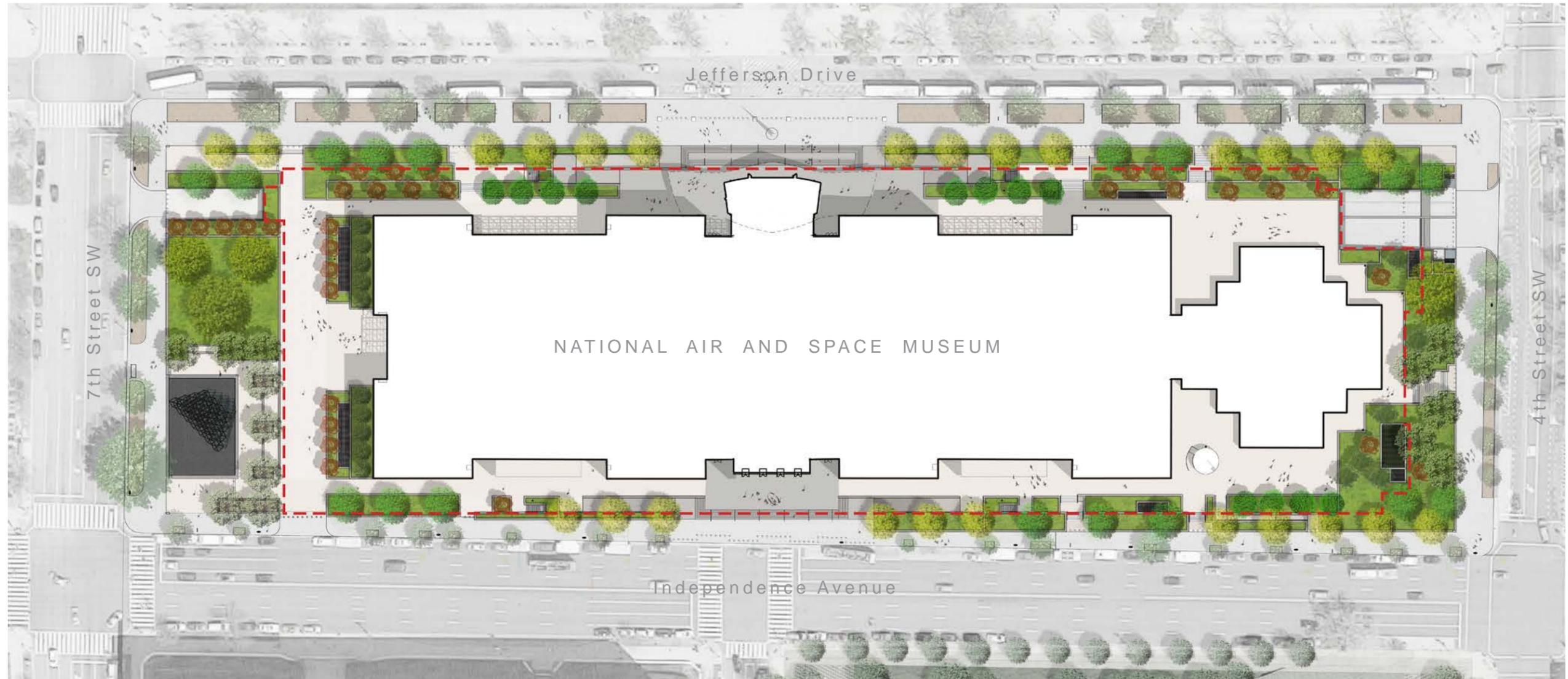
--- Basement Edge of Structure



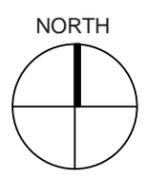
Illustrative Plan - Concept Design (Approved: CFA June 2016/NCPC July 2016)



Smithsonian Institution
National Air and Space Museum



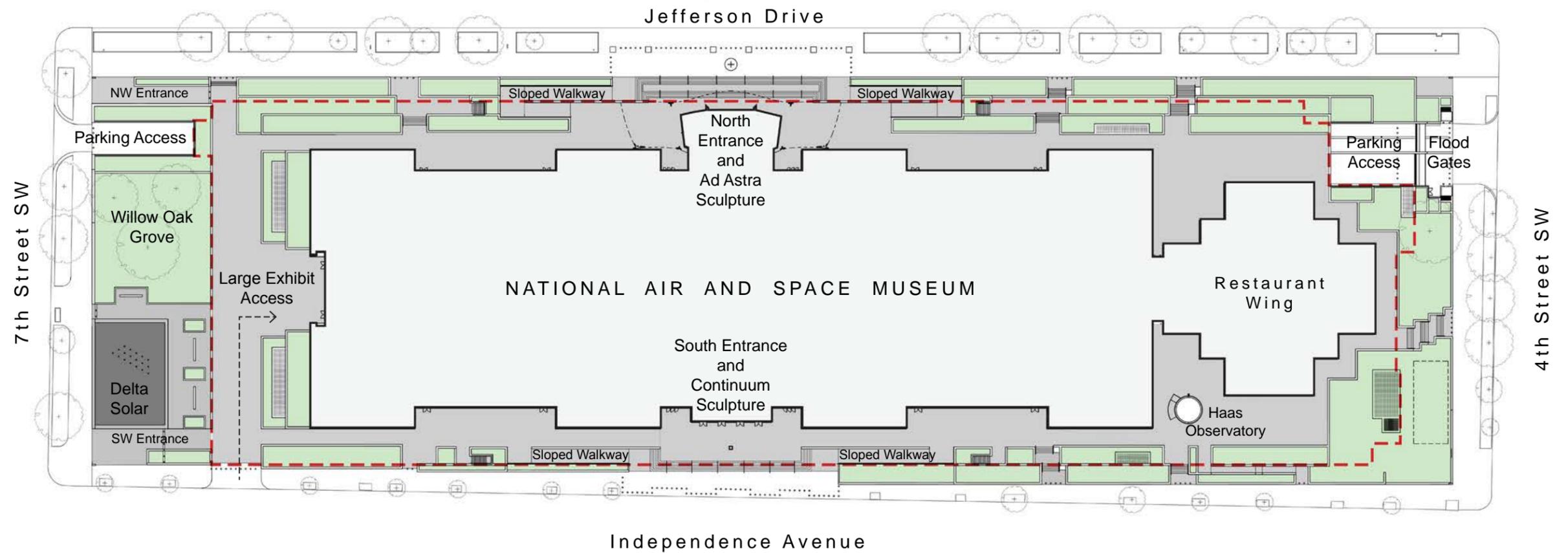
--- Basement Edge of Structure



Illustrative Plan - (Current Proposed Design)



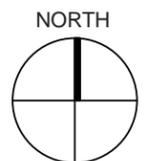
Smithsonian Institution
National Air and Space Museum

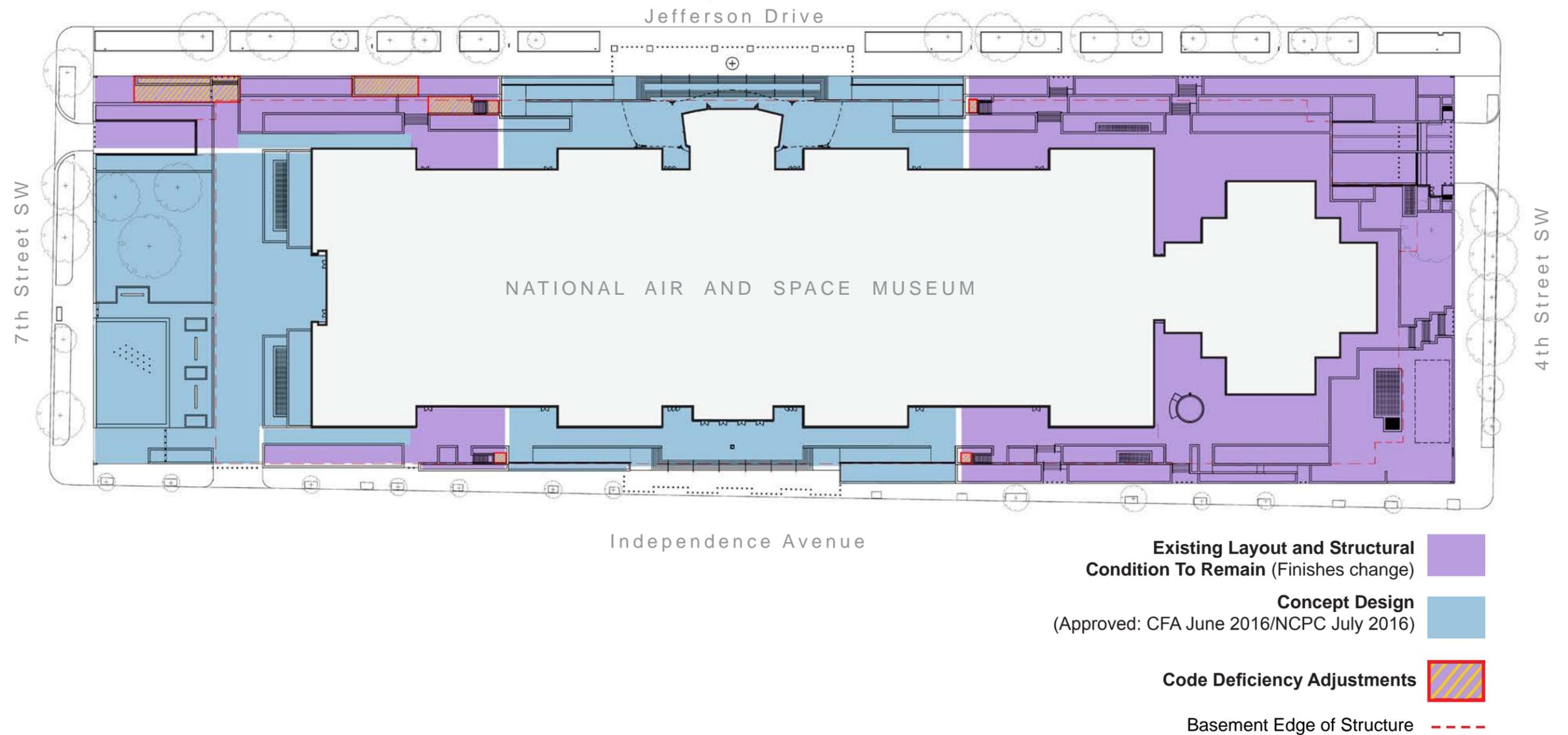


Annotated Plan - (Current Proposed Design)

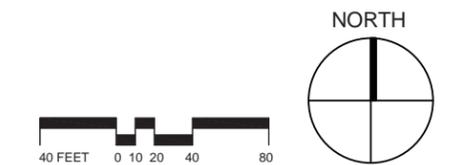


--- Basement Edge of Structure





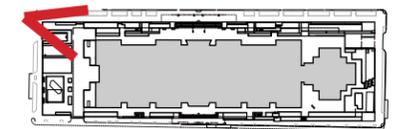
Site Plan - Current Proposed Design





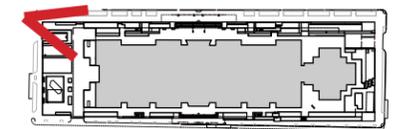
Entrance Perspective - Northwest Corner - Existing Condition





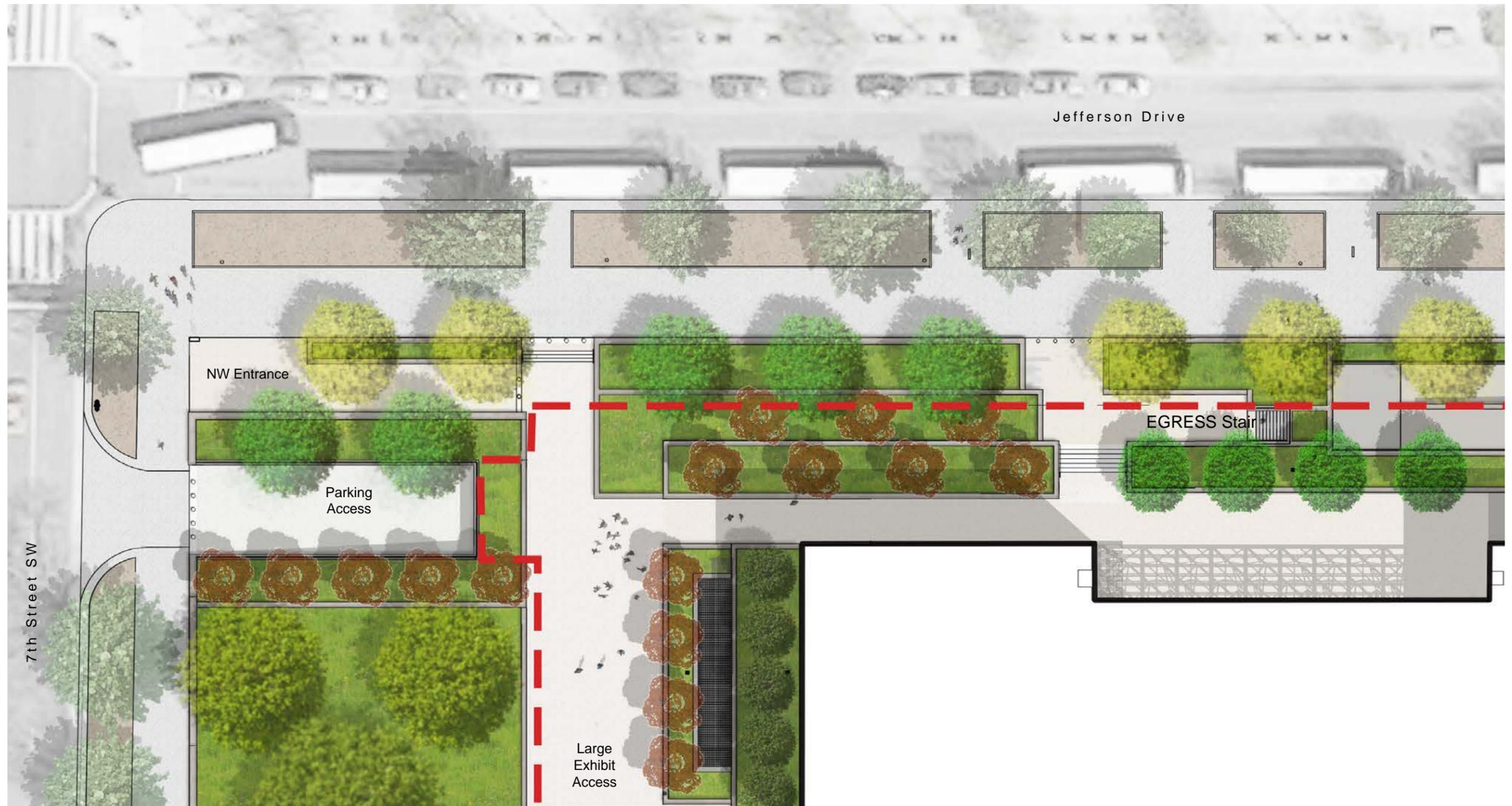
Entrance Perspective - Northwest Corner - Concept Design (Approved: CFA June 2016/NCPC July 2016)



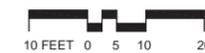


Entrance Perspective - Northwest Corner - Current Proposed Design



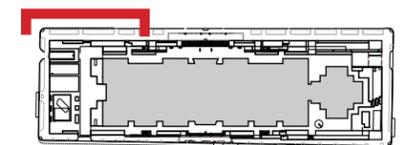
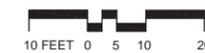


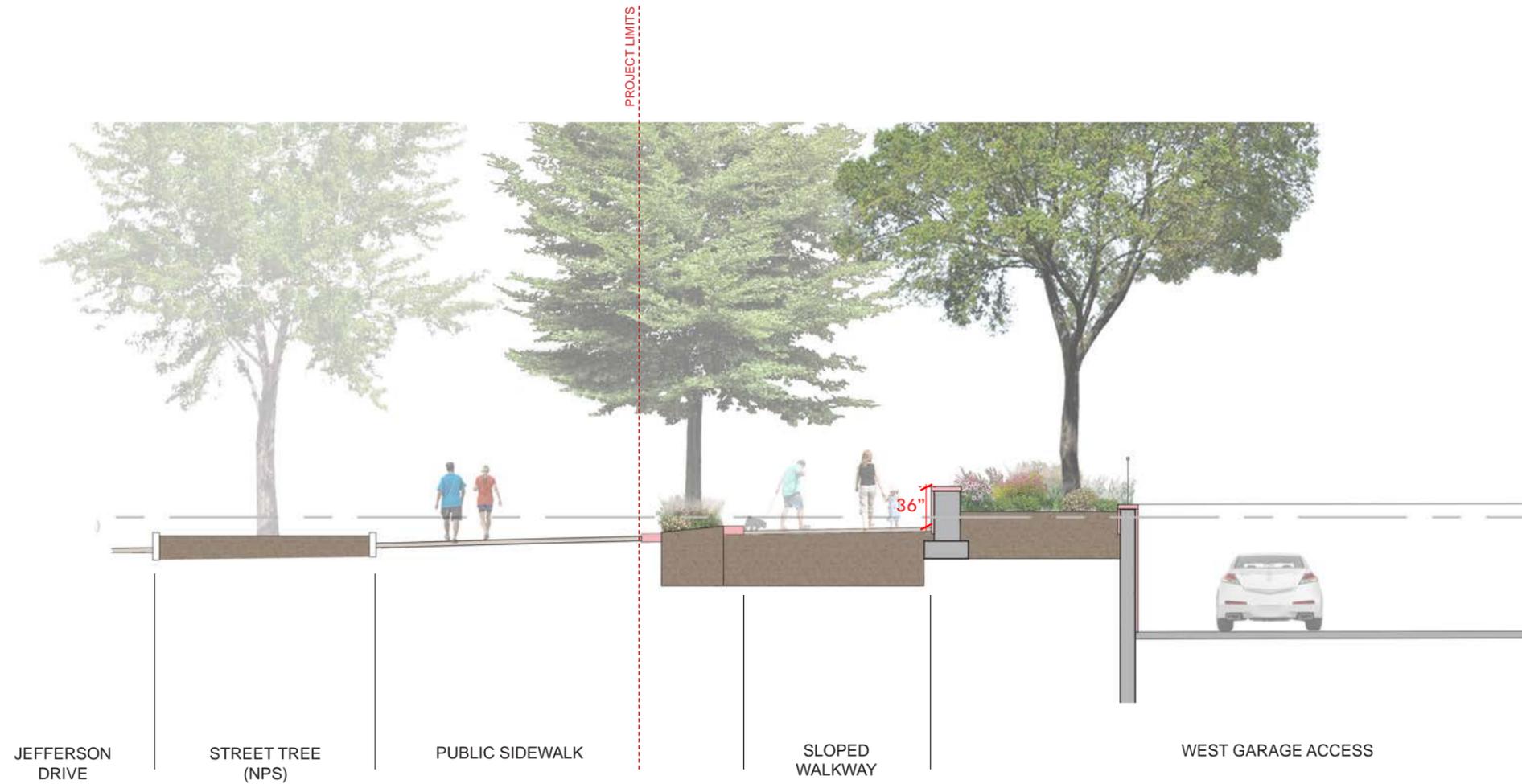
Enlargement Plan - Northwest Corner - Current Proposed Design



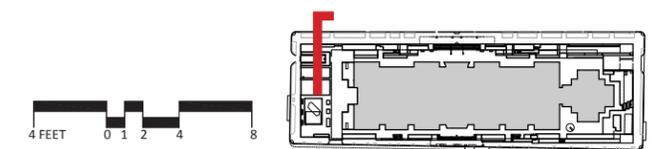


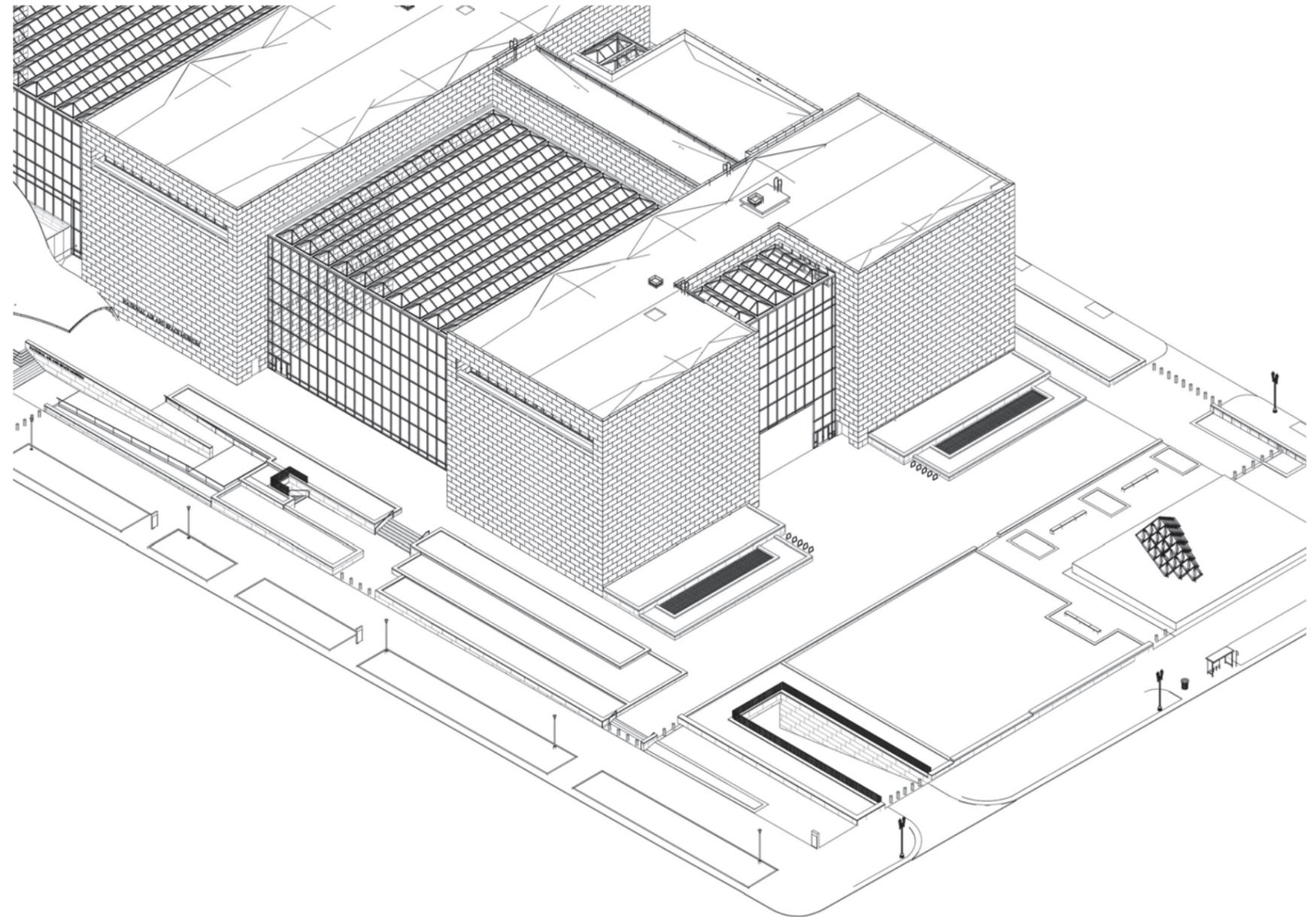
Site Elevation - Northwest Corner - Current Proposed Design



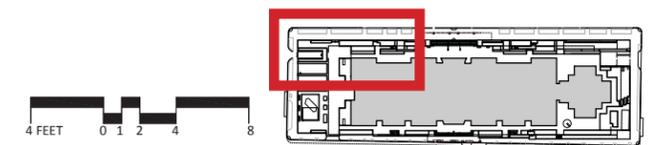


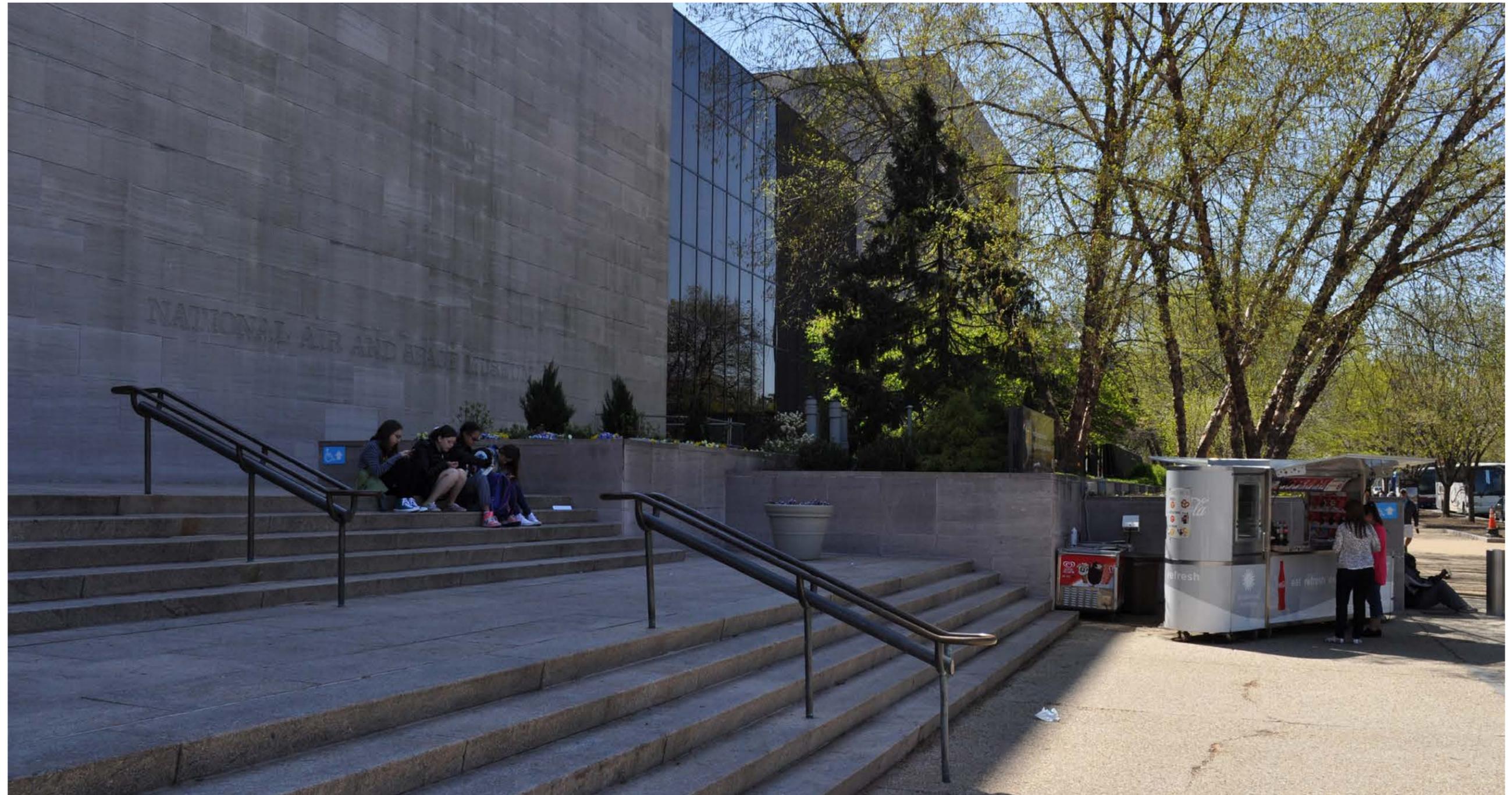
Section - Northwest corner - Current Proposed Design





Axonometric Drawing - Northwest corner - Current Proposed Design





Entrance Perspective - North Building Entrance - Existing Condition





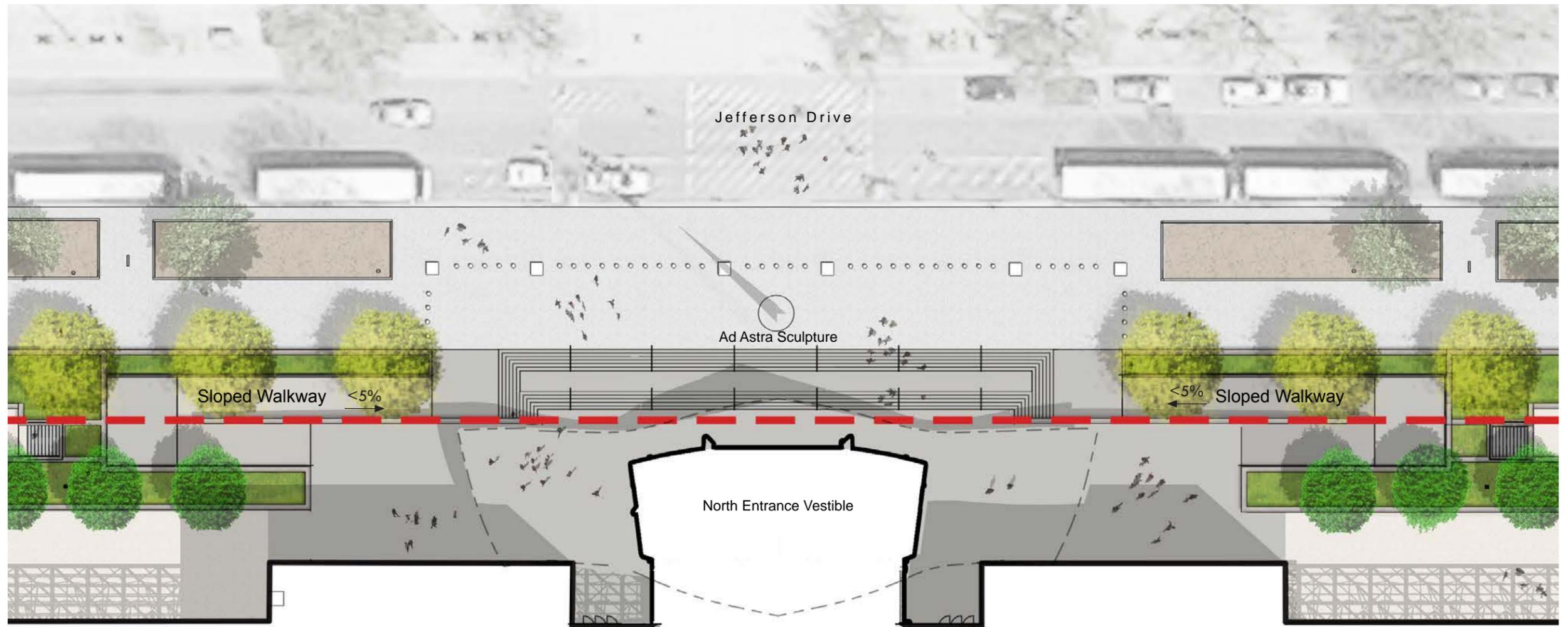
Entrance Perspective - North Building Entrance - Concept Design (Approved: CFA June 2016/NCPC July 2016)



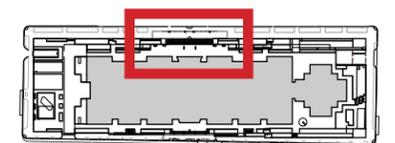
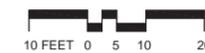


Entrance Perspective - North Building Entrance - Current Proposed Design



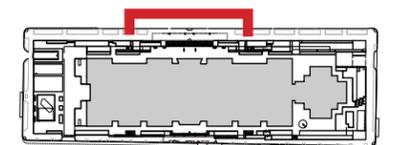


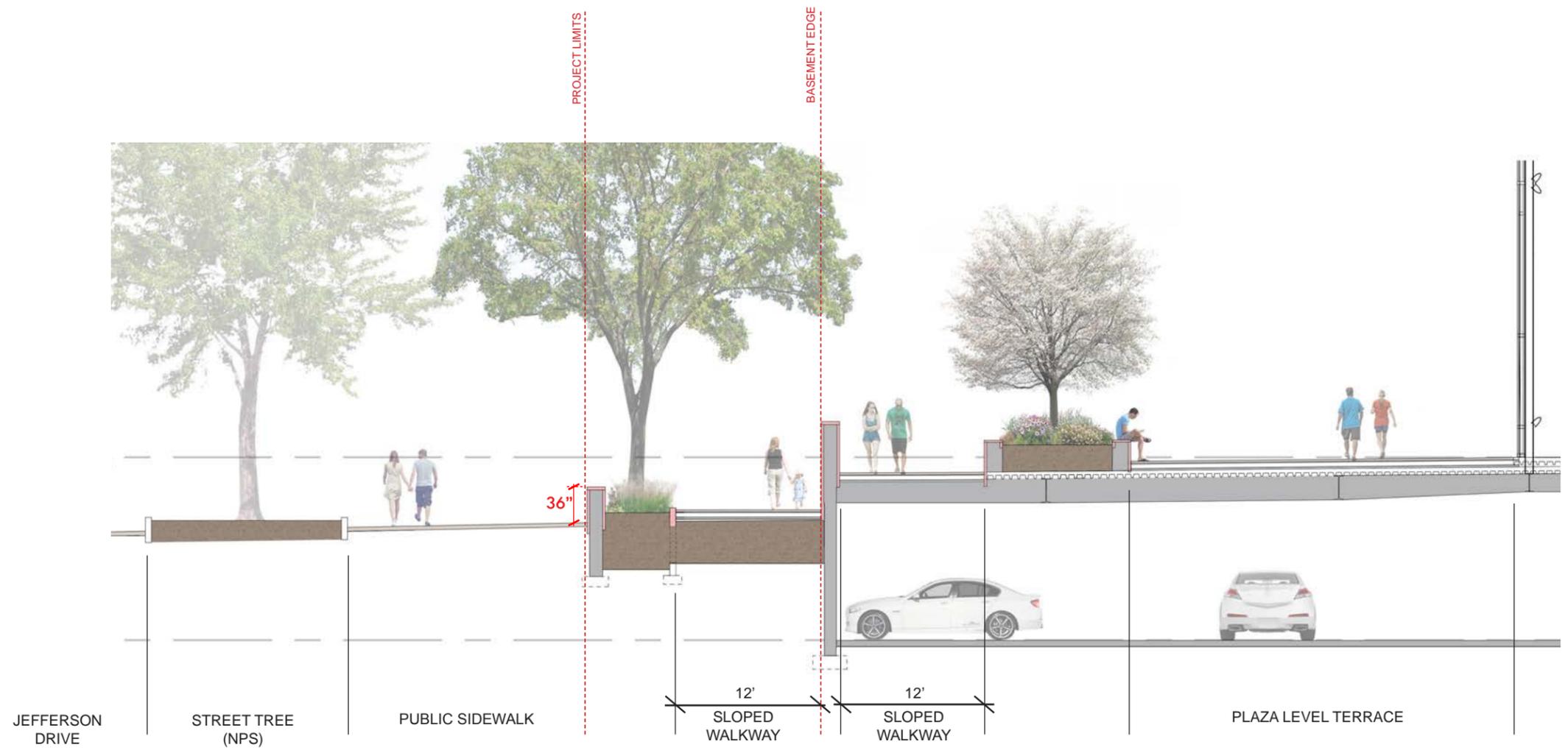
Enlargement Plan - North Building Entrance - Current Proposed Design



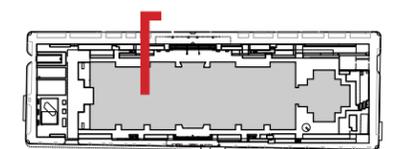


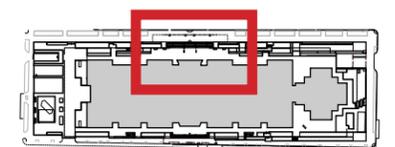
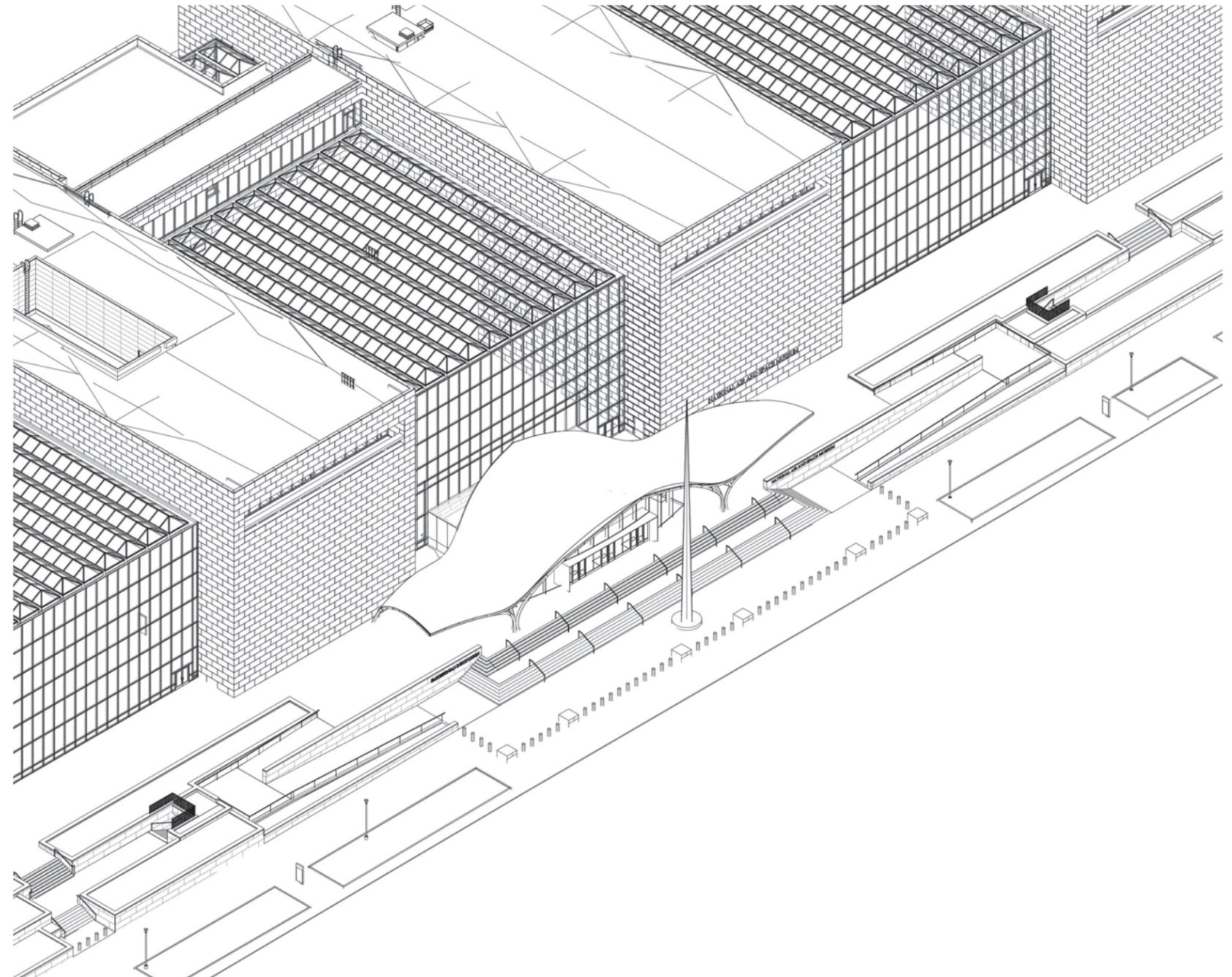
Site Elevation - North Building Entrance - Current Proposed Design





Section - North Building Entrance - Current Proposed Design





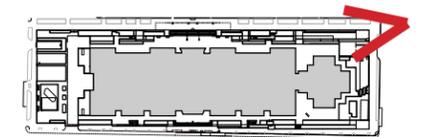
Axonometric Drawing - North Building Entrance - Current Proposed Design





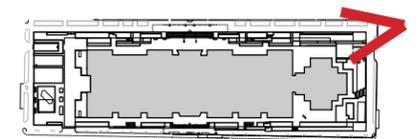
Entrance Perspective - Northeast Corner - Existing Condition





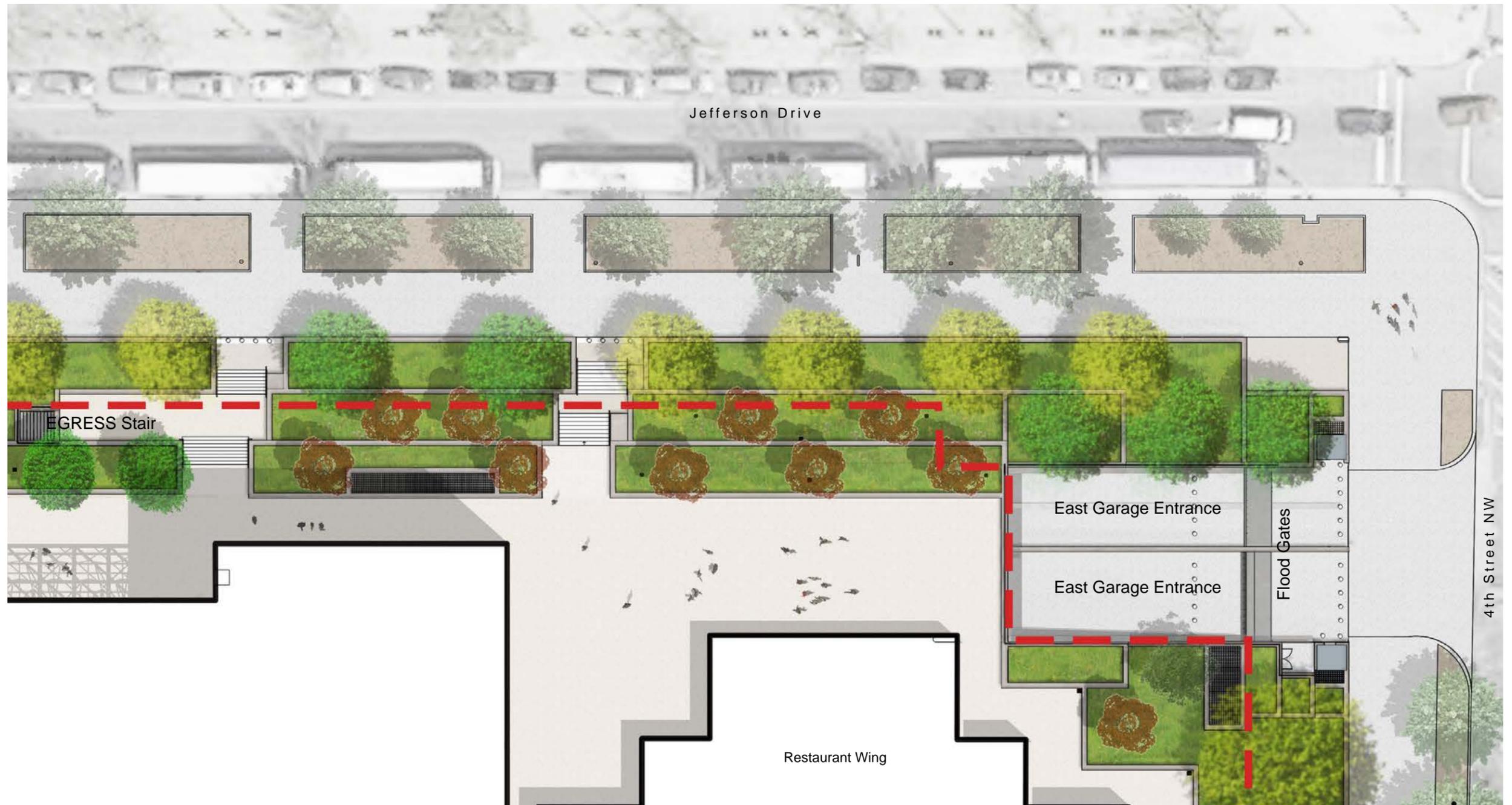
Entrance Perspective - Northeast Corner - Concept Design (Approved: CFA June 2016/NCPC July 2016)



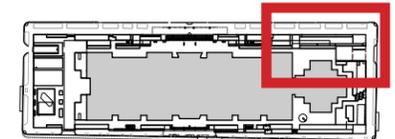


Entrance Perspective - Northeast Corner - Current Proposed Design



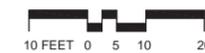


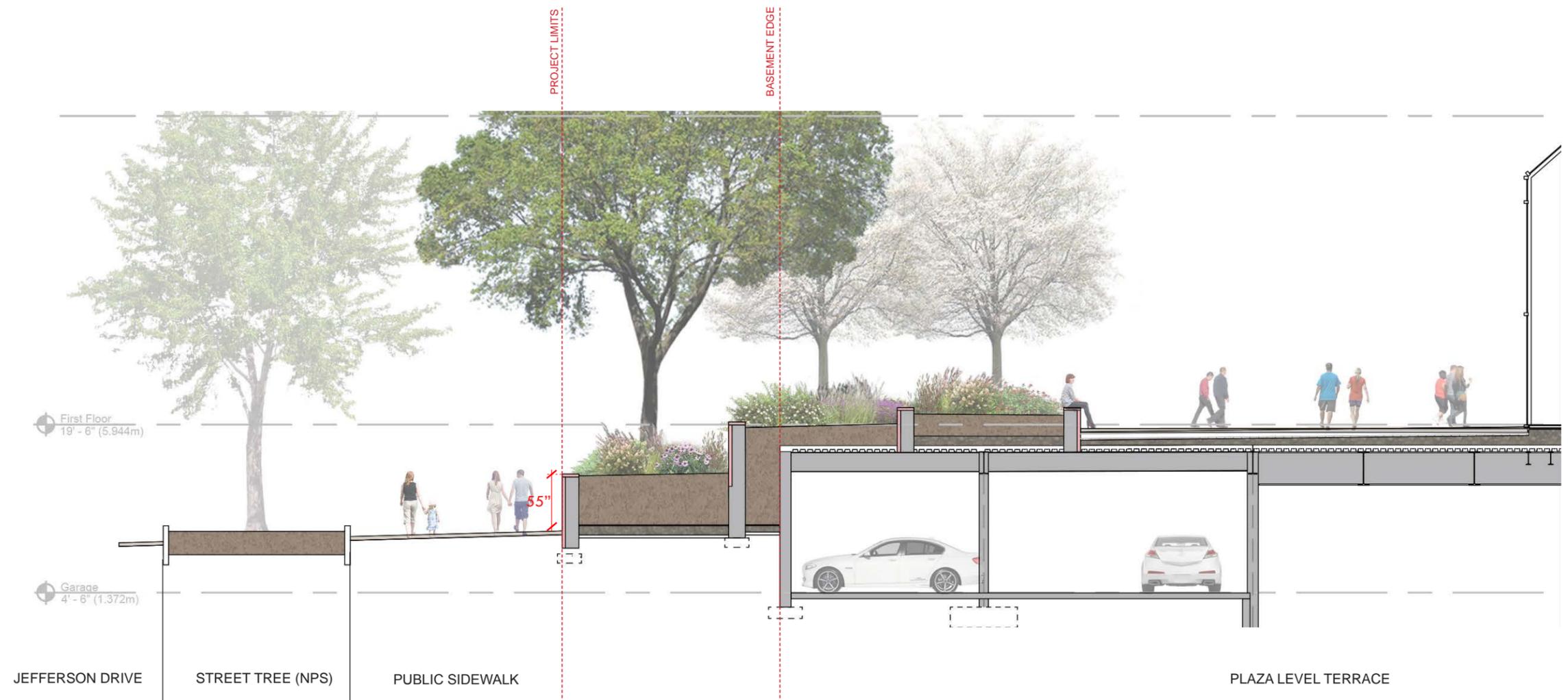
Enlargement Plan - Northeast Corner - Current Proposed Design



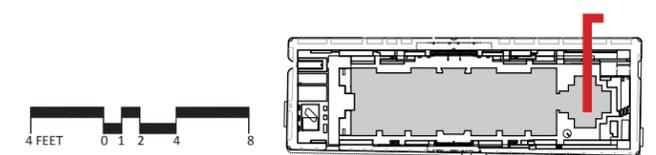


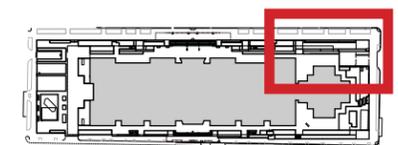
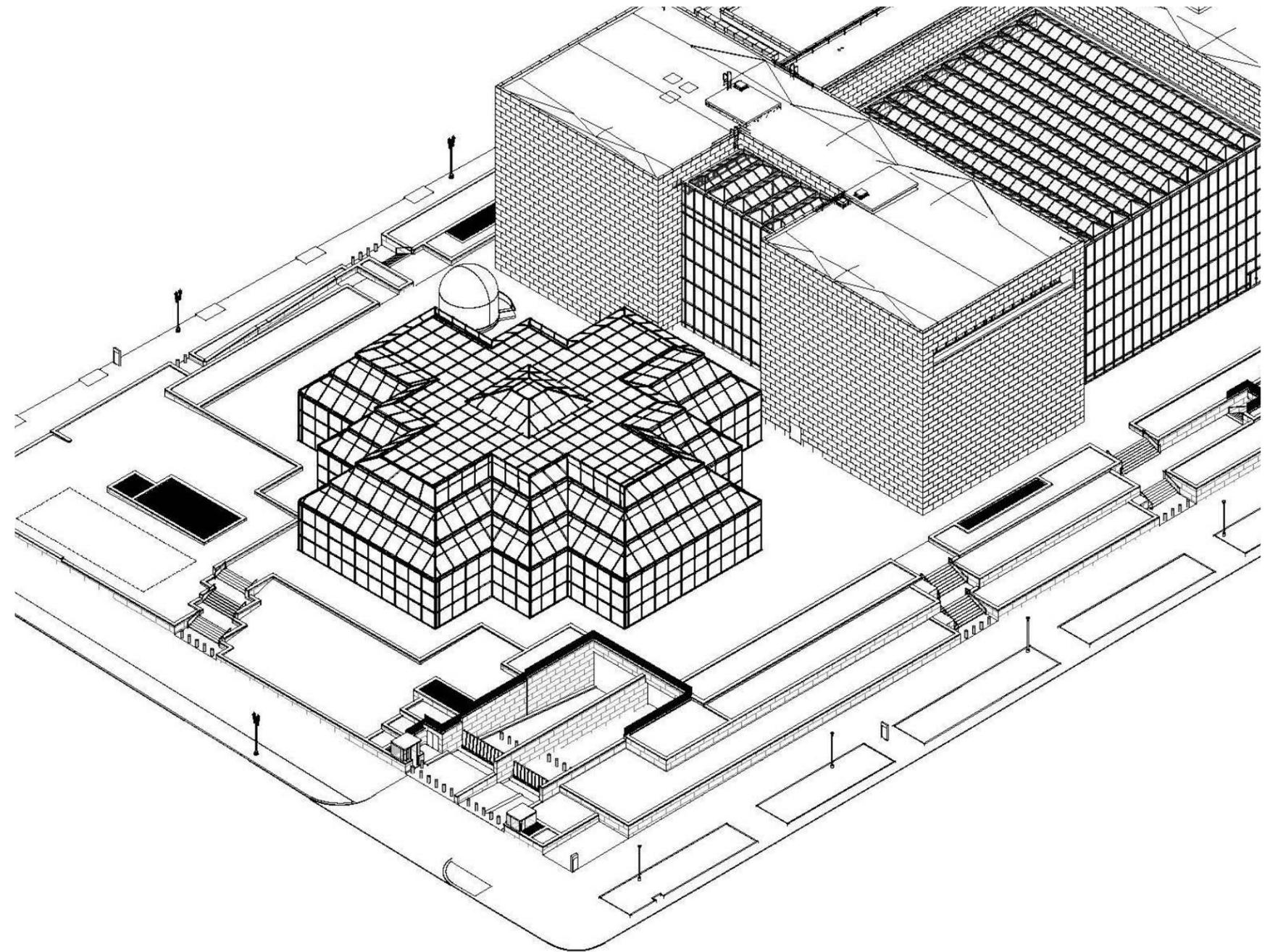
Site Elevation - Northeast Corner - Current Proposed Design





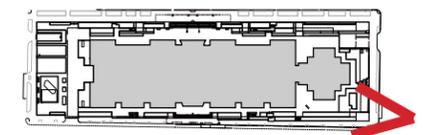
Section - Northeast Corner - Current Proposed Design





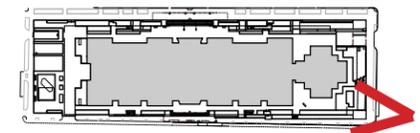
Axonometric Drawing - Northeast Corner - Current Proposed Design





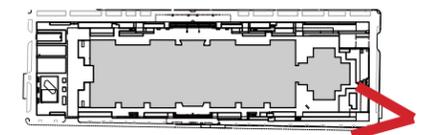
Entrance Perspective - Southeast Corner - Existing Condition





Entrance Perspective - Southeast Corner - Concept Design (Approved: CFA June 2016/NCPC July 2016)



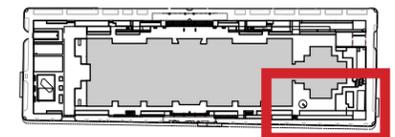


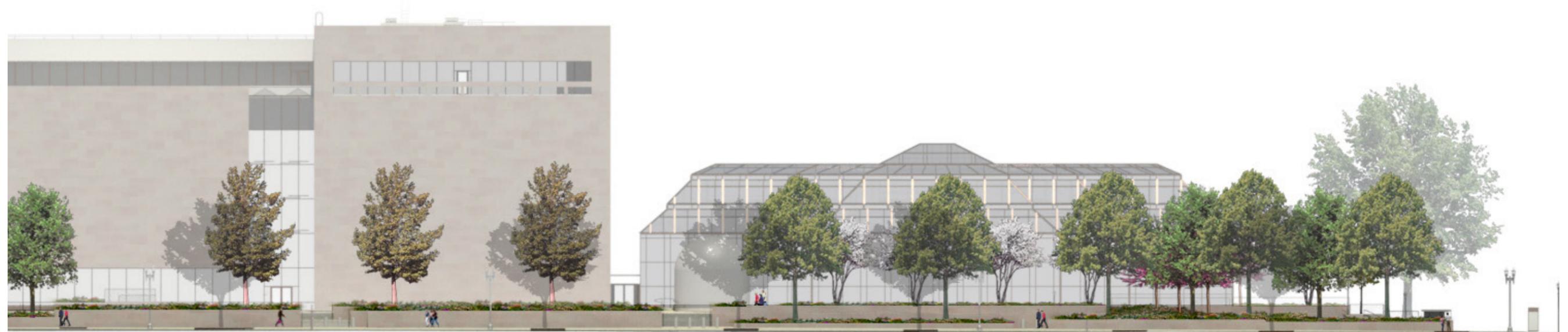
Entrance Perspective - Southeast Corner - Current Proposed Design



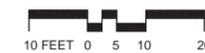


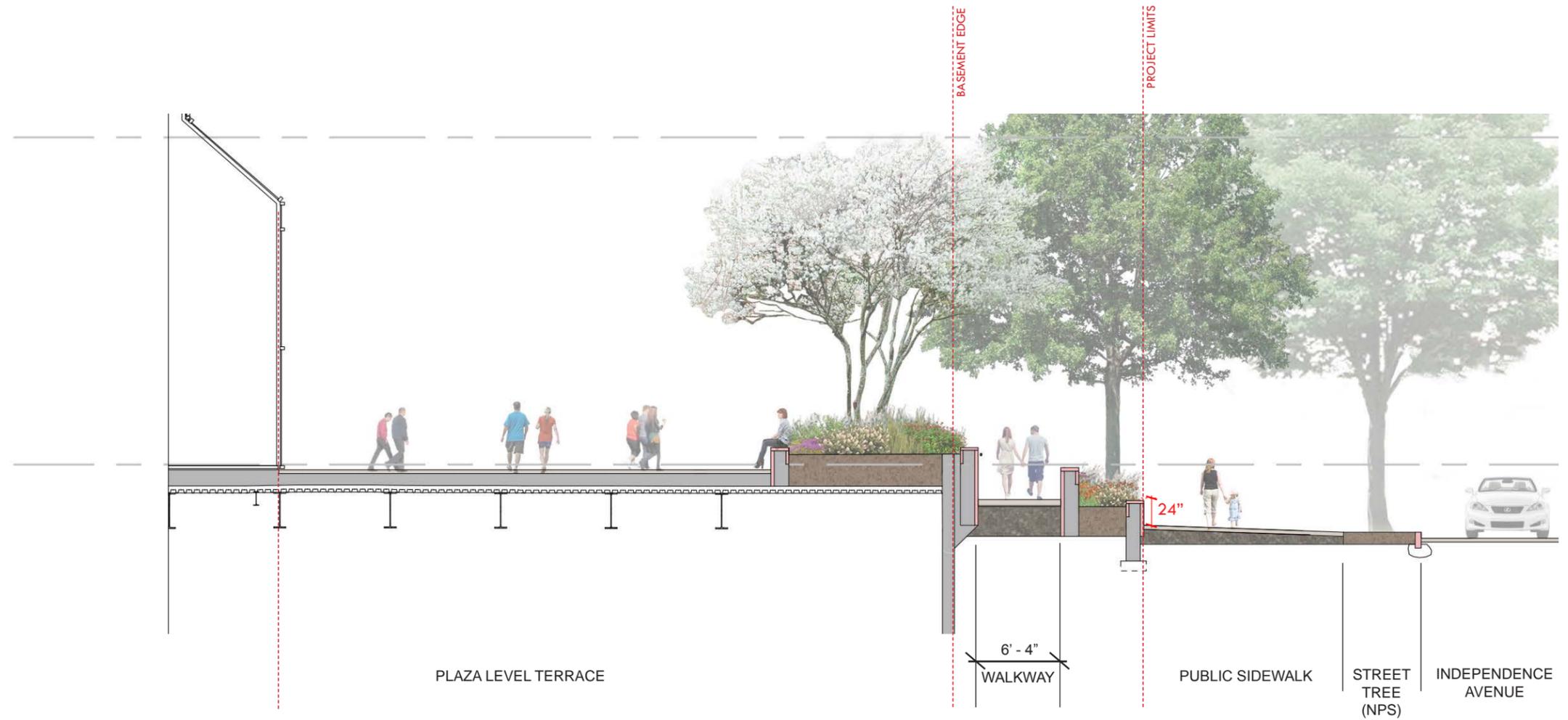
Enlargement Plan -Southeast Corner - Current Proposed Design





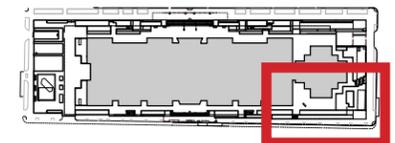
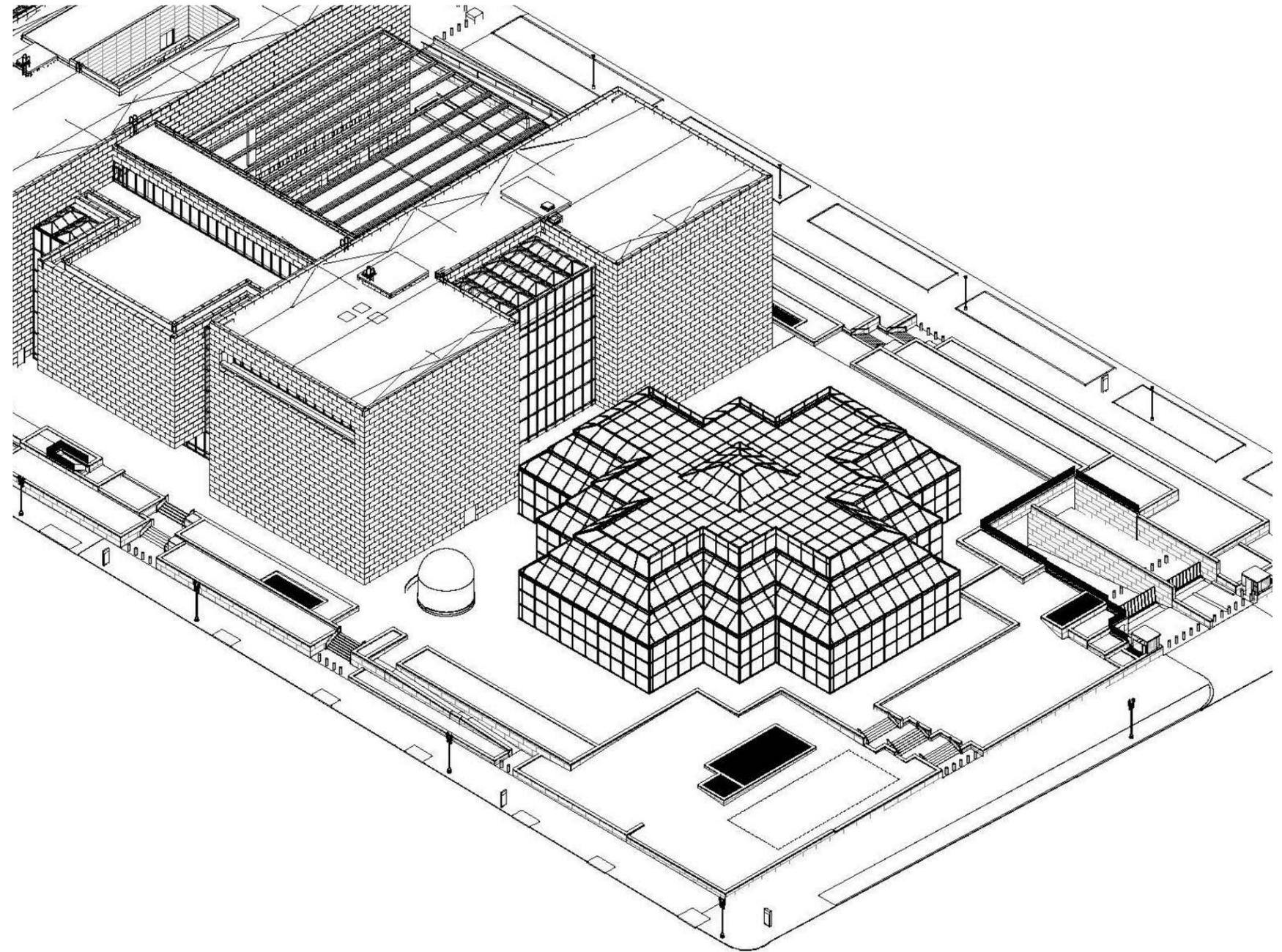
Site Elevation - Southeast Corner - Current Proposed Design





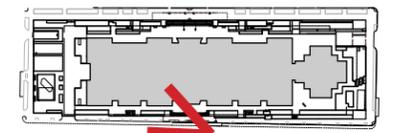
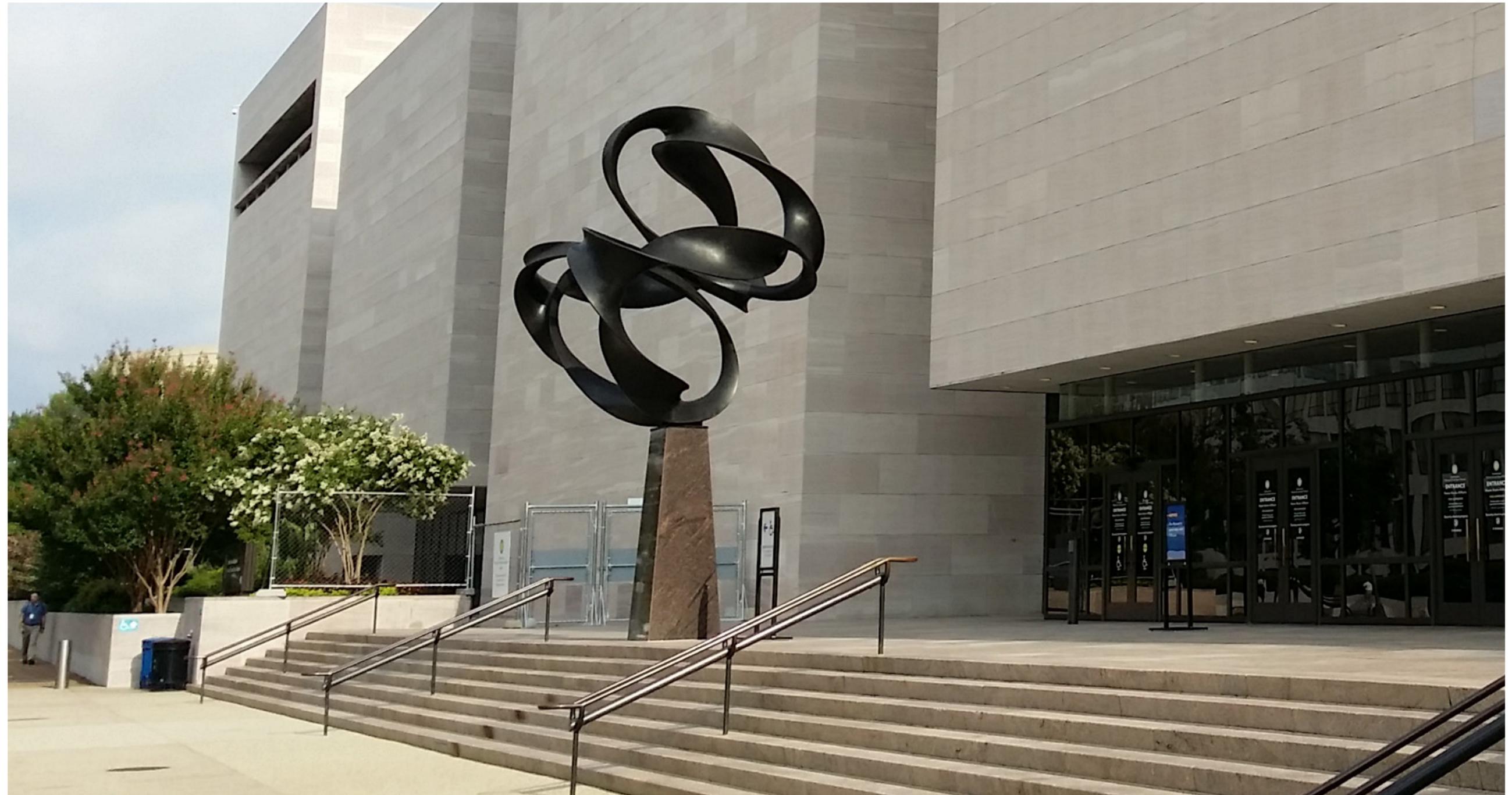
Section - Southeast Corner - Current Proposed Design





Axonometric Drawing - Southeast Corner - Current Proposed Design



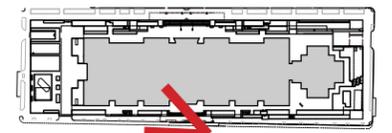


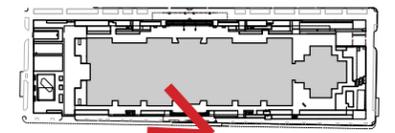
Entrance Perspective - South Building Entrance - Existing Condition





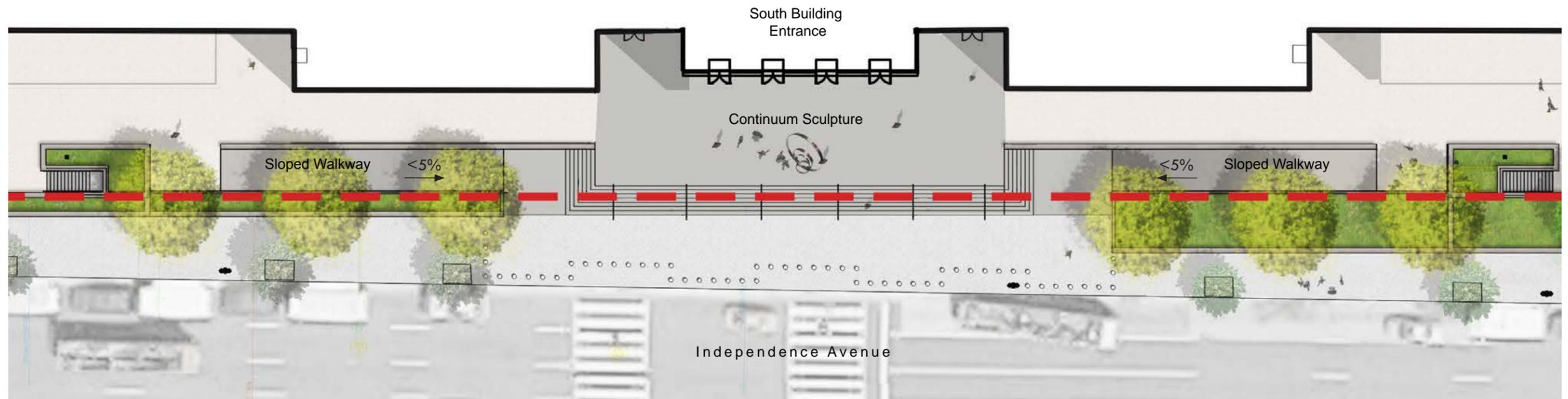
Entrance Perspective - South Building Entrance - Concept Design (Approved: CFA June 2016/NCPC July 2016)



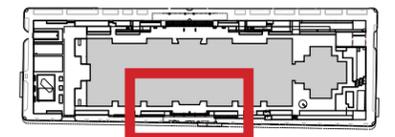
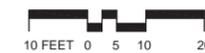


Entrance Perspective - South Building Entrance - Current Proposed Design



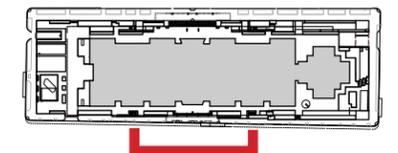


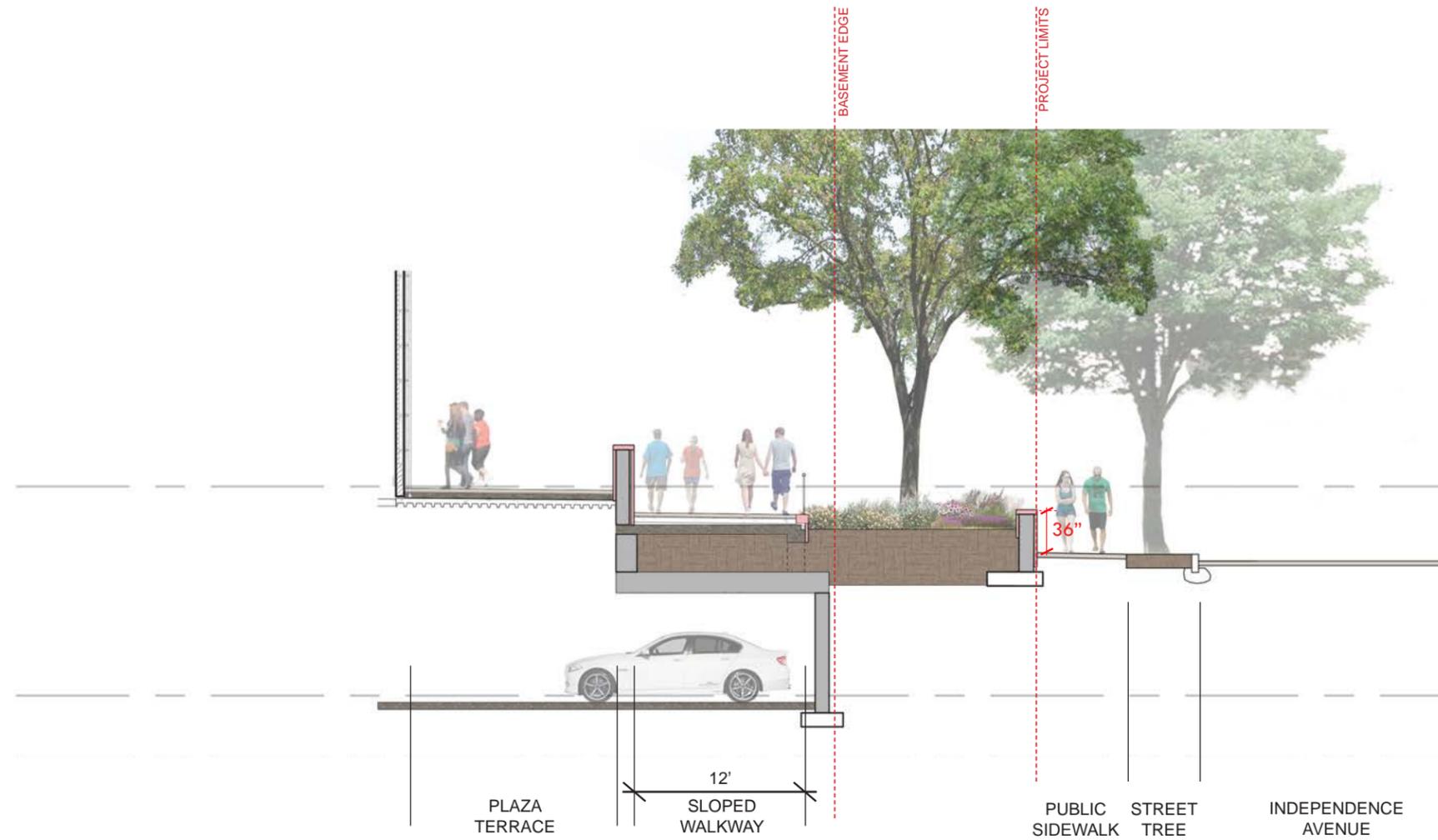
Enlargement Plan -South Building Entrance - Current Proposed Design



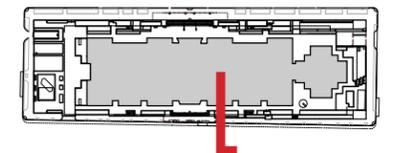


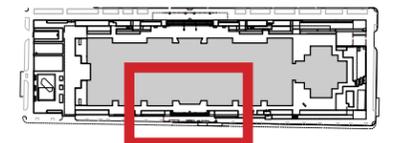
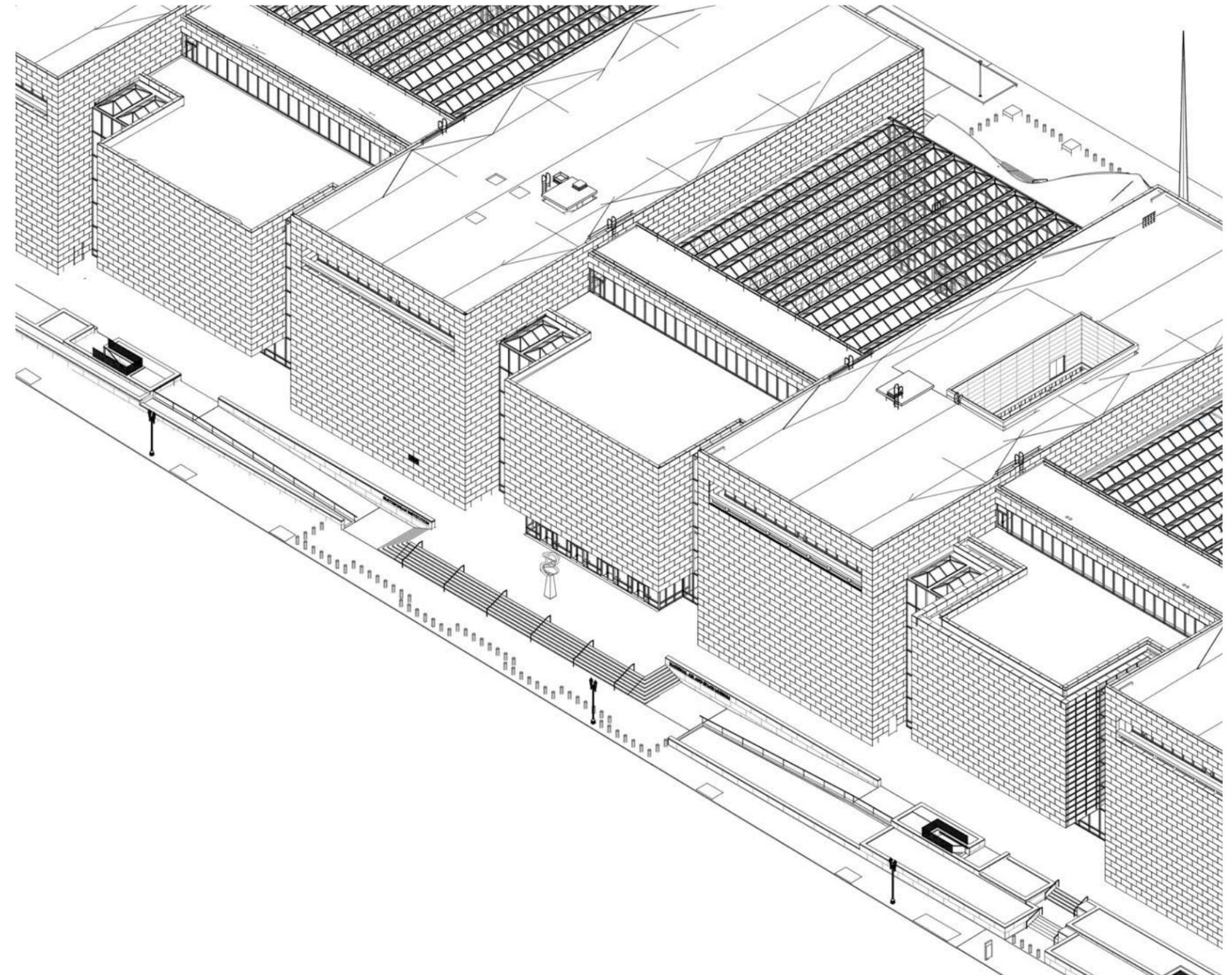
Site Elevation - South Building Entrance - Current Proposed Design





Section - South Building Entrance - Current Proposed Design



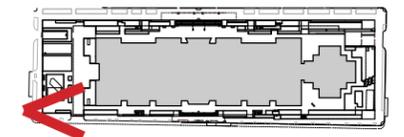


Axonometric Drawing - South Building Entrance - Current Proposed Design



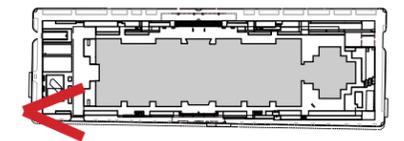


Entrance Perspective - Southwest Corner - Existing Condition



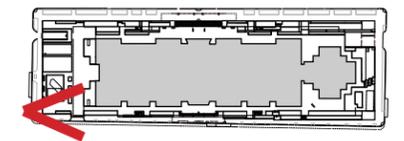


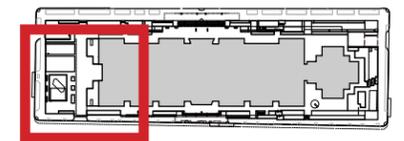
Entrance Perspective - Southwest Corner - Concept Design (Approved: CFA June 2016/NCPC July 2016)





Entrance Perspective - Southwest Corner - Current Proposed Design





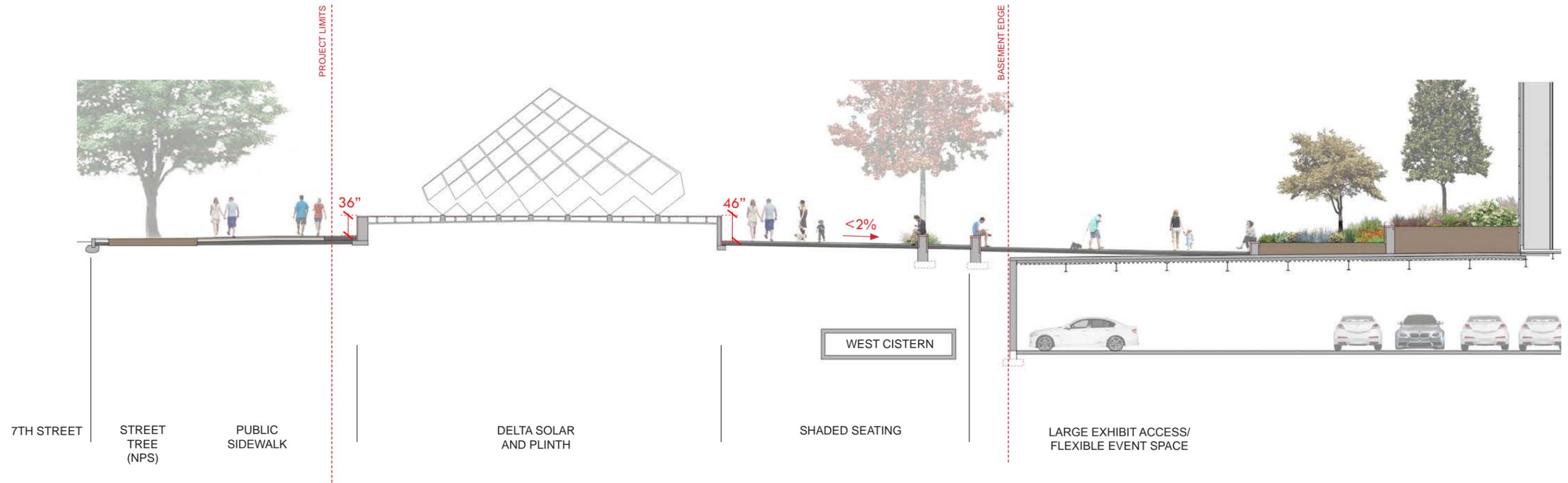
Enlargement Plan - Southwest Corner - Current Proposed Design



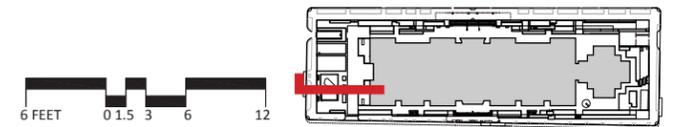


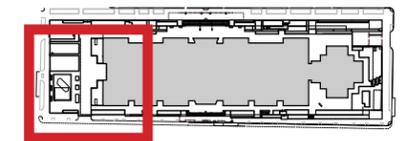
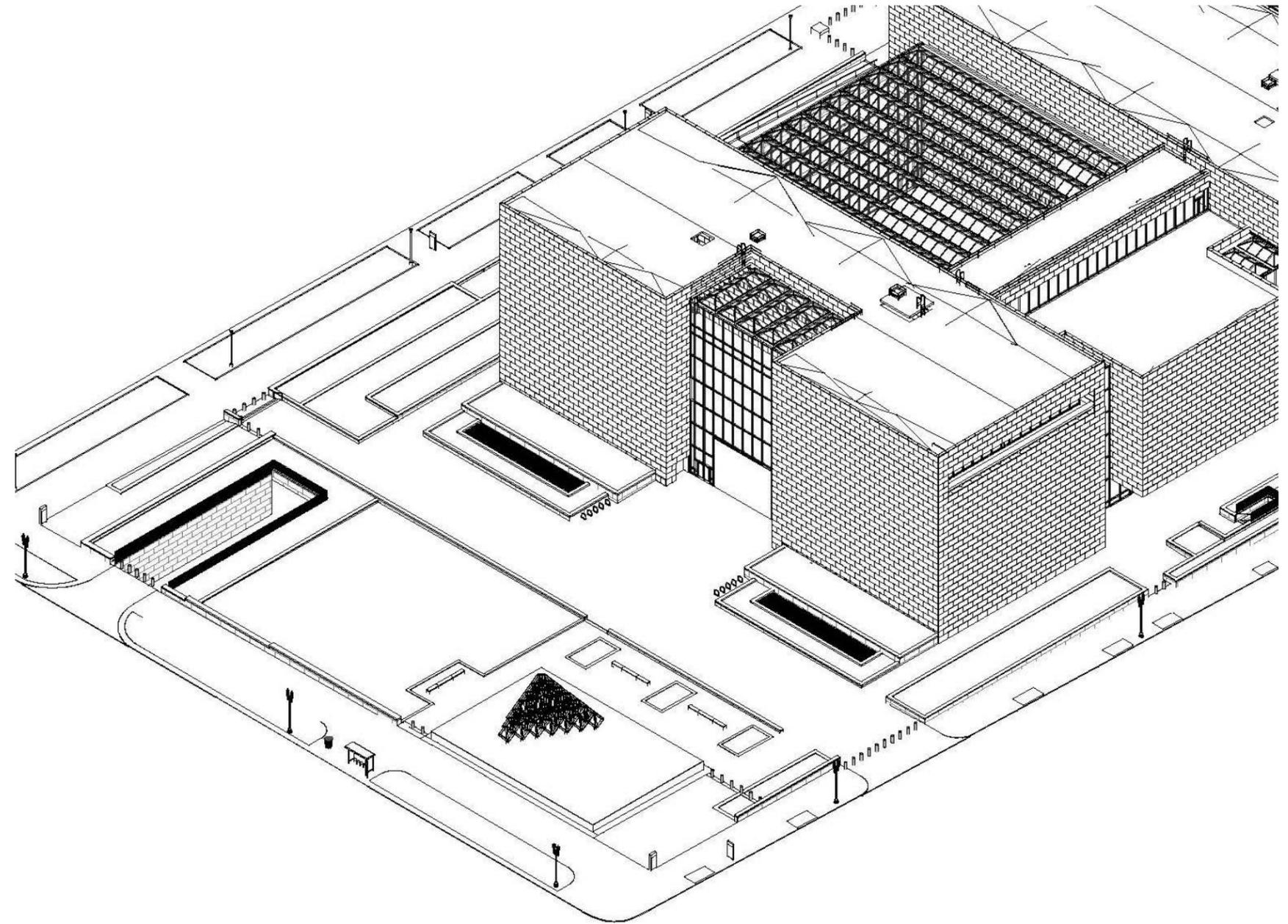
Site Elevation - Southwest Corner - Current Proposed Design





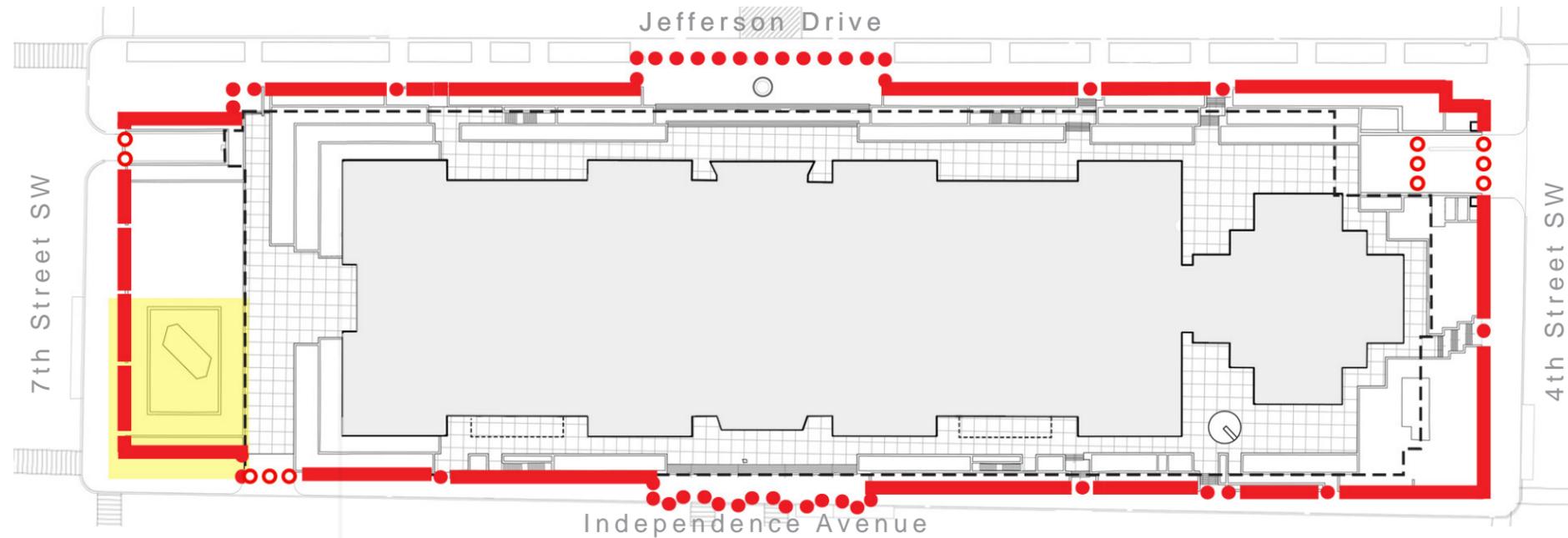
Section - Southwest Corner - Current Proposed Design



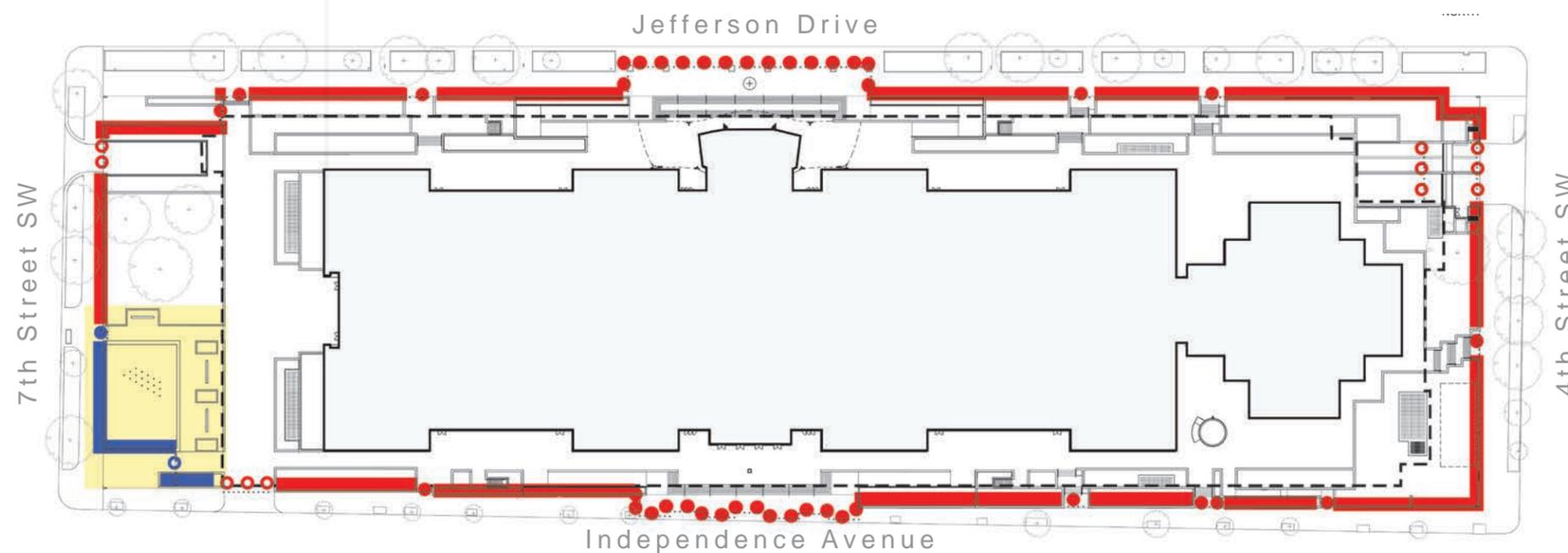


Axonometric Drawing - Southwest Corner - Current Proposed Design



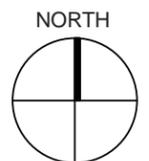


Existing Conditions



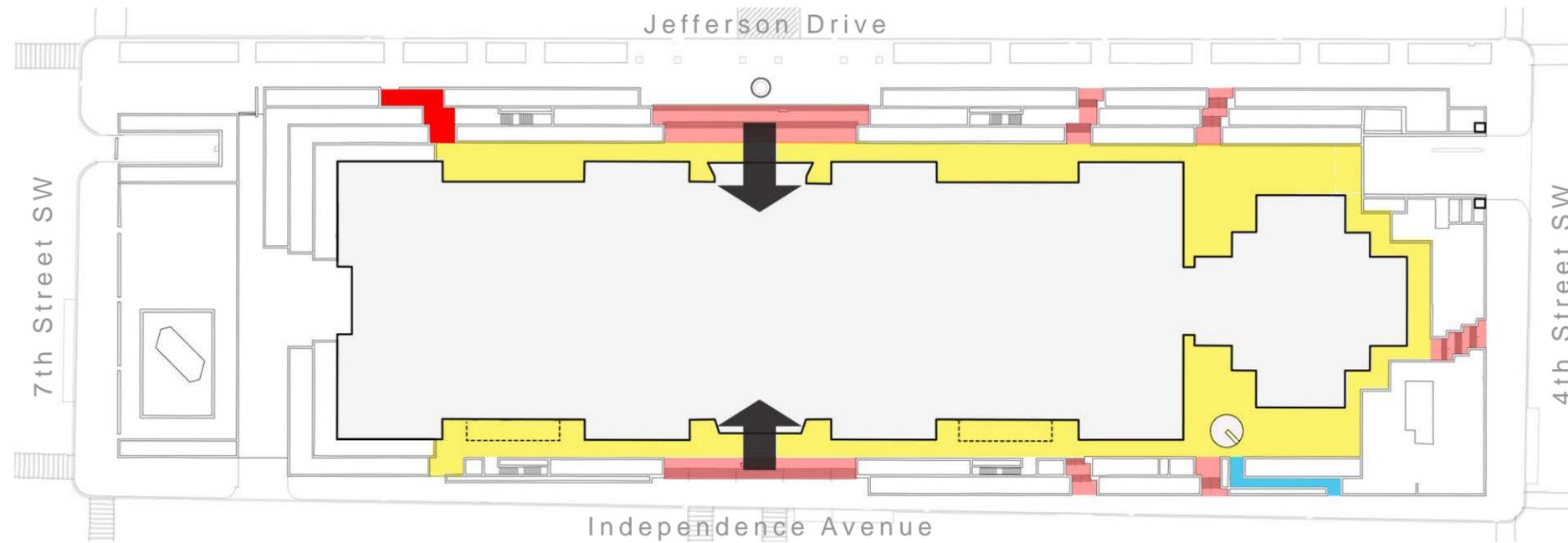
Current Proposed Design

- █ Existing Secure Wall
- █ Proposed Secure Wall
- Existing Bollards
- Existing Operable Bollards
- Proposed Bollards
- Proposed Operable Bollards
- Areas of Difference



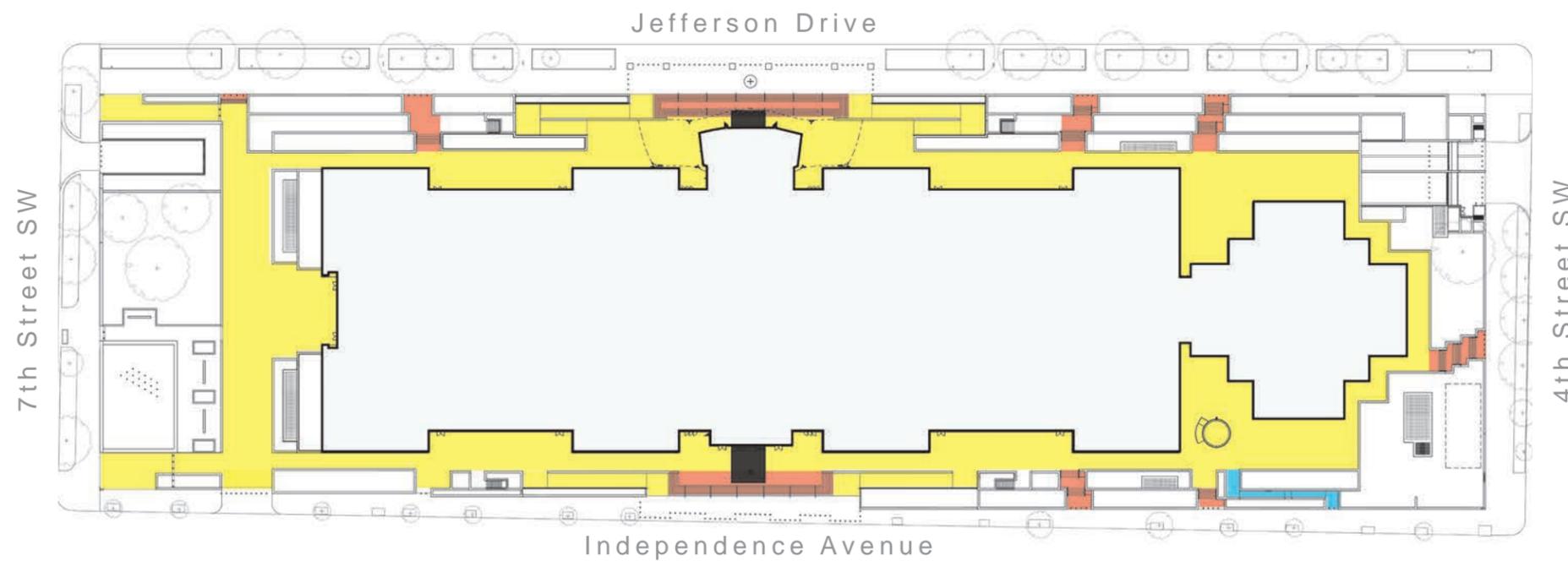
Perimeter Security





Existing Conditions

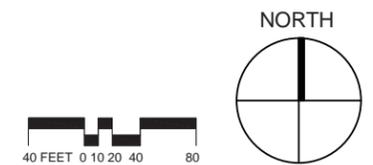
- Non ADA Compliant Ramp (1)
- Stairs (7)
- Accessible Walkways (1)
- At Grade Route (1)

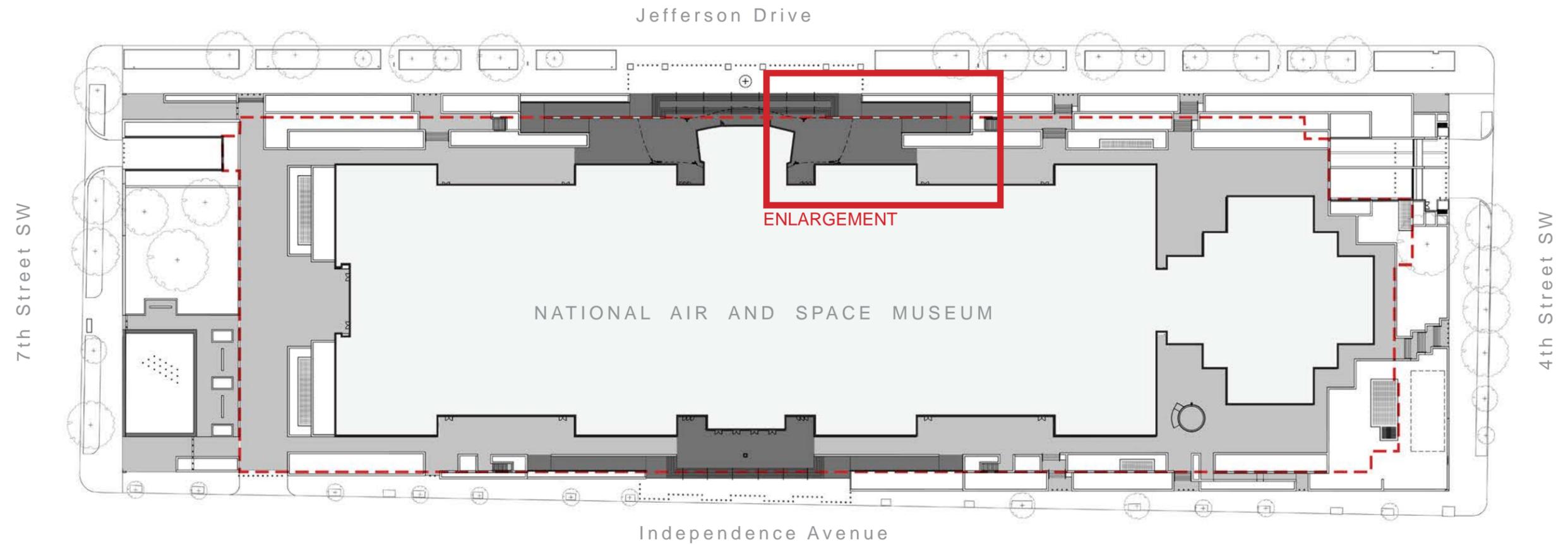


Current Proposed Design

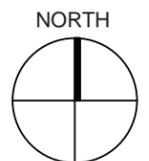
- Stairs (9)
- ADA Compliant Ramp (1)
- At Grade Route (7)

Accessibility



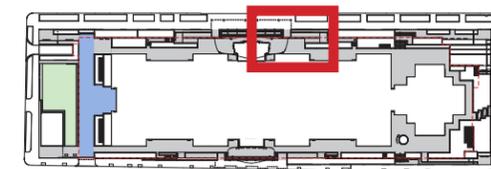
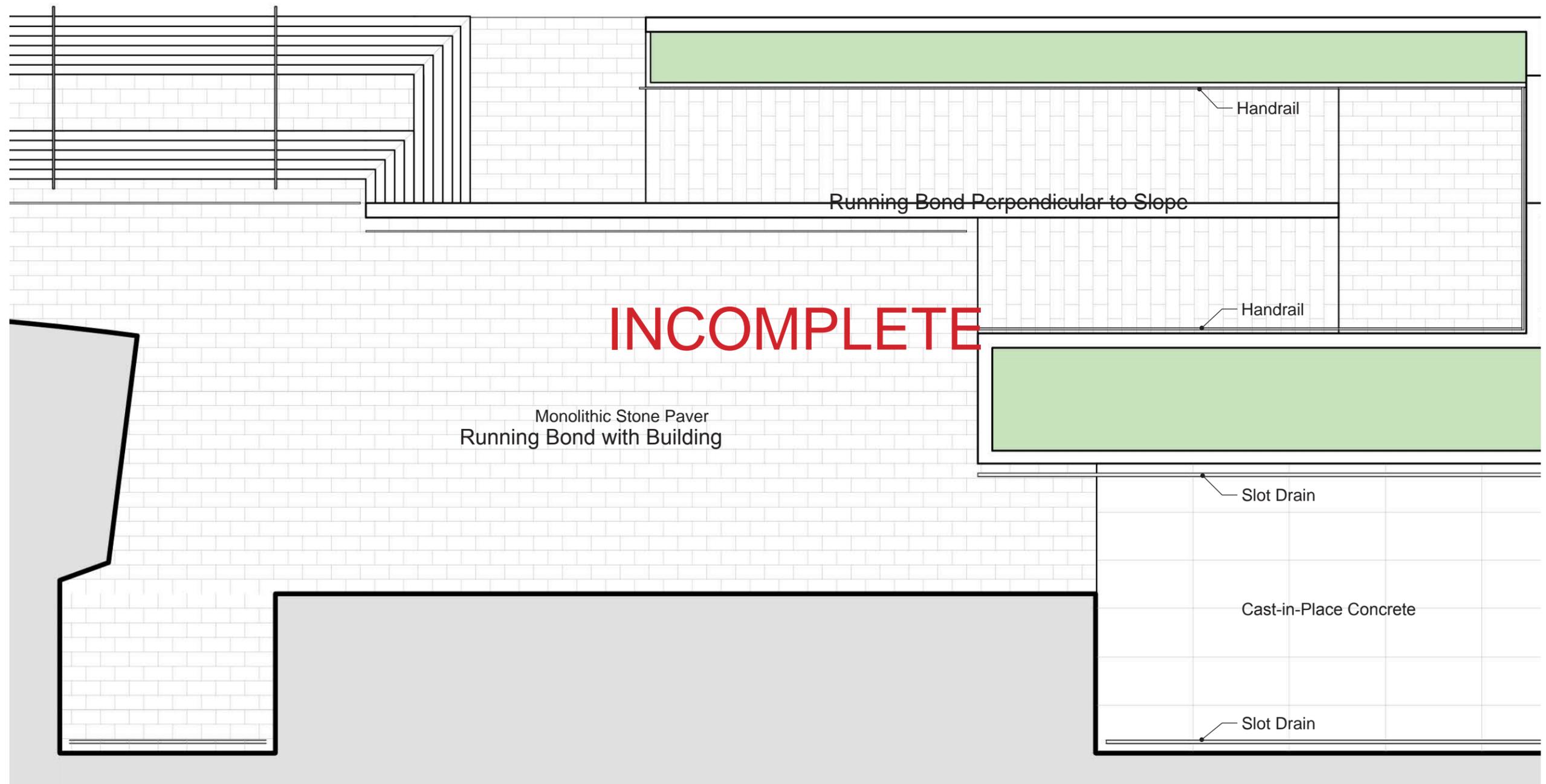


- Cast-in-Place Concrete, Exposed Aggregate, Grid Joint Pattern
- Monolithic Stone Paver, Running Bond Pattern
- Basement Edge of Structure



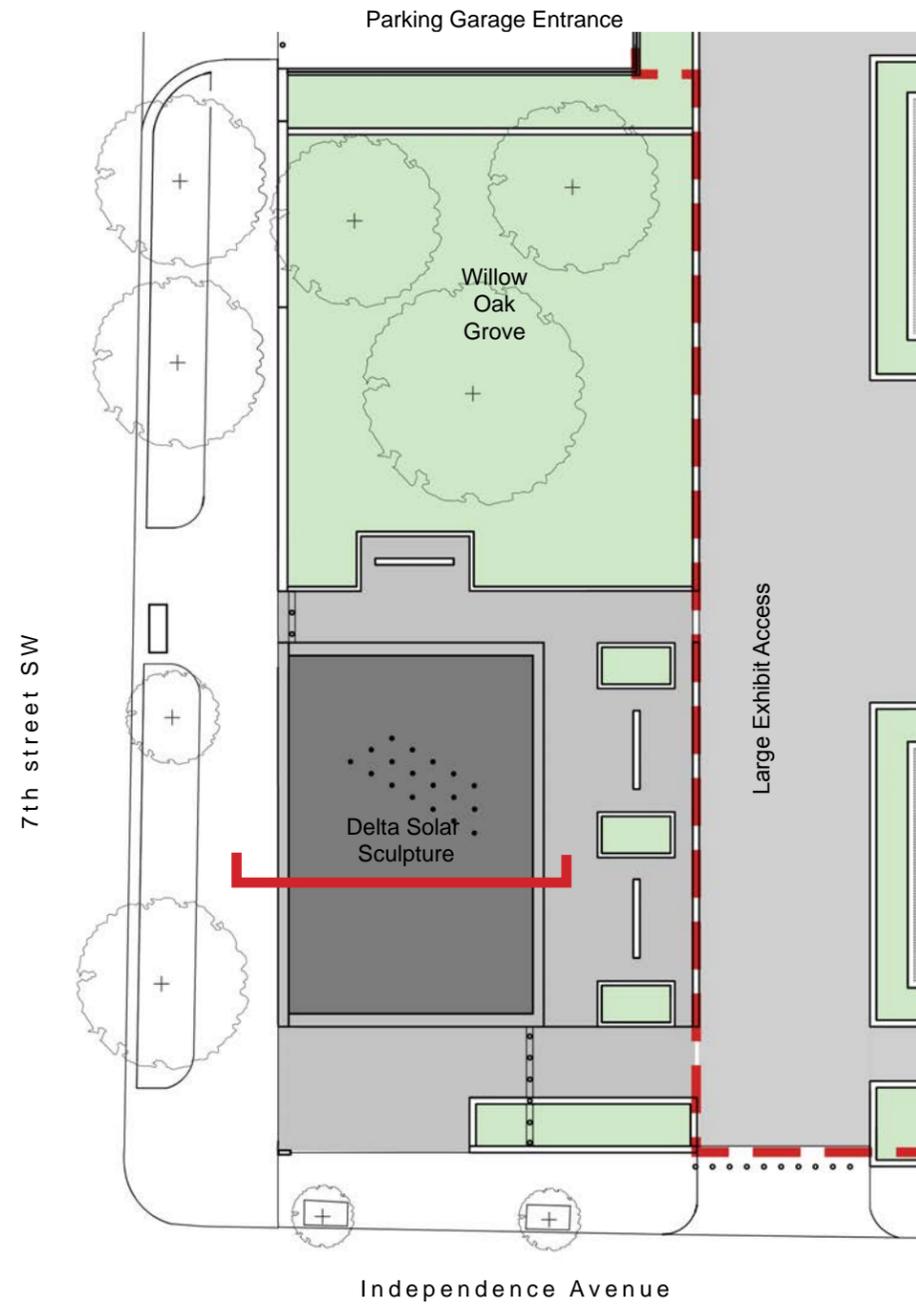
Paving Design Concept - Overall Plan



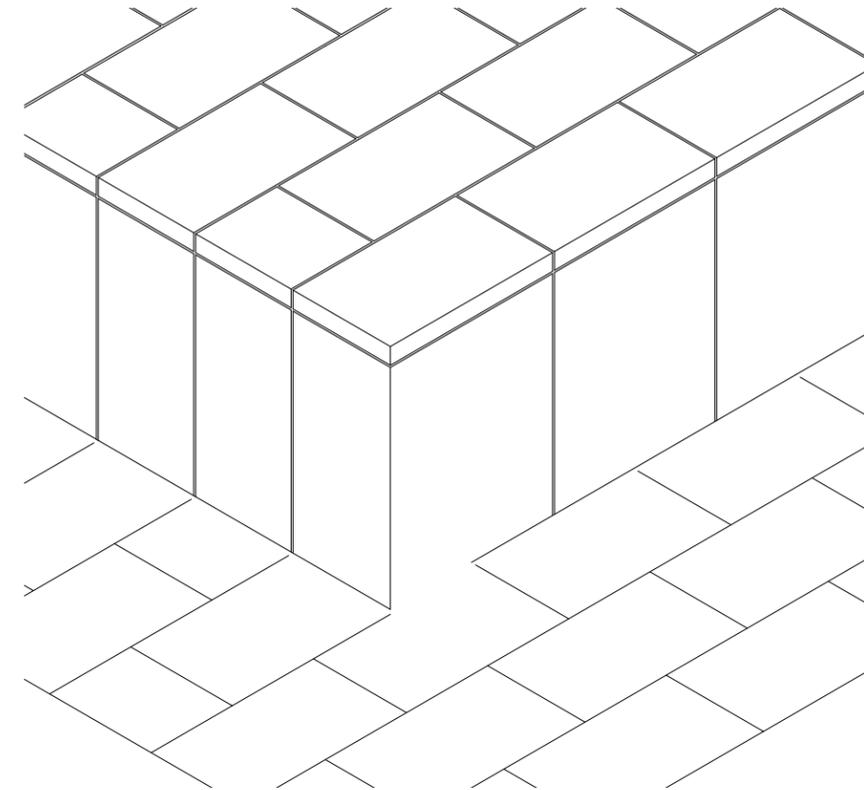


Paving Design Concept - North Entrance Enlargement

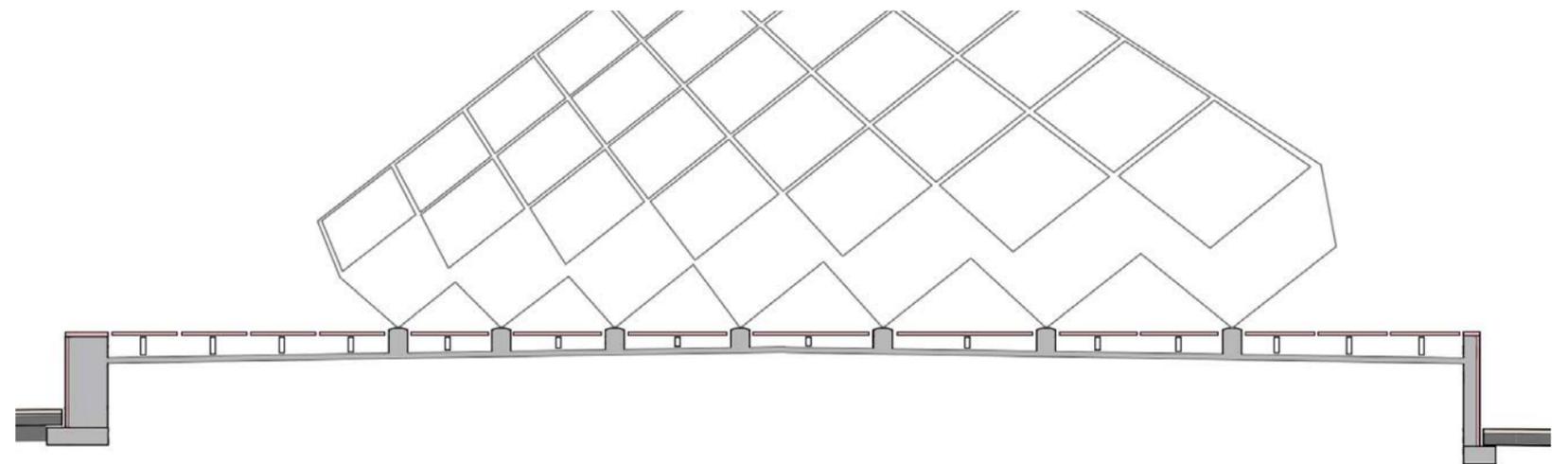




Plan



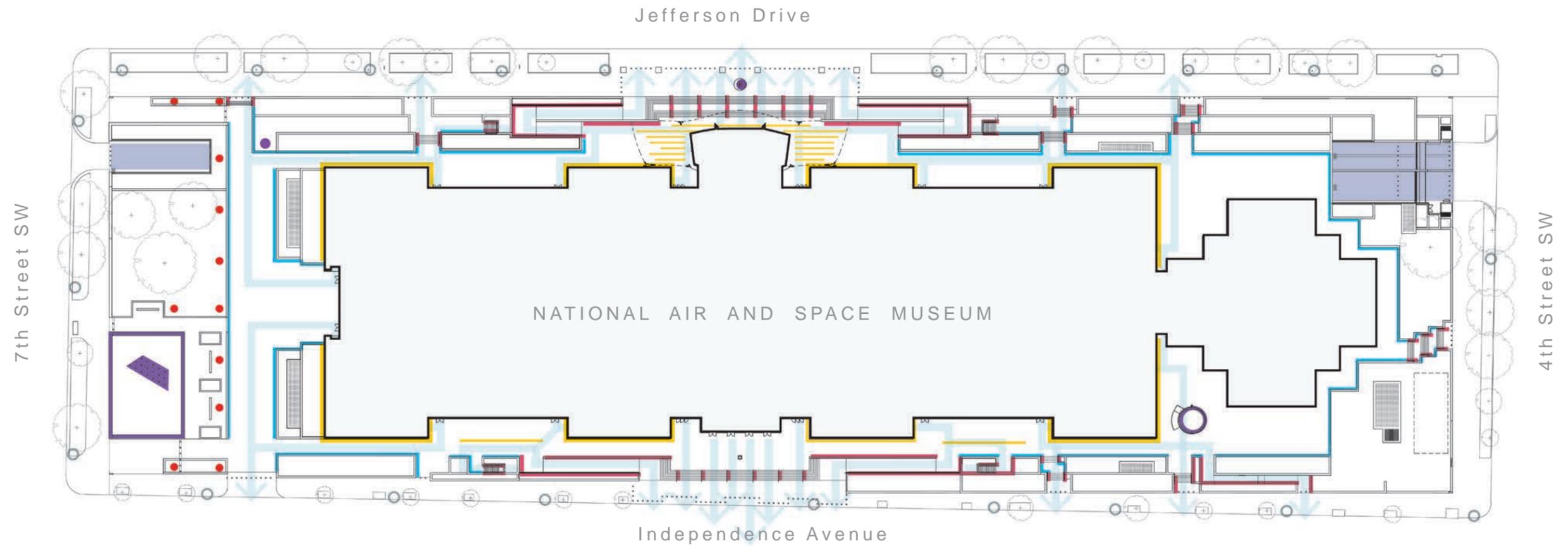
Axon - Plinth Corner Stone



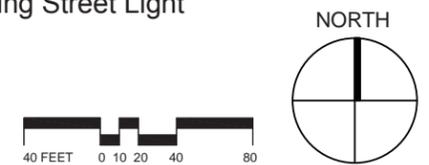
Section

Delta Solar Plinth





-  EGRESS path
-  Feature Uplight
-  Facade Uplight
-  Linear Canopy Uplight
-  Pedestrian Postlight
-  Illuminated Handrail
-  Linear Seatwall Detail
-  Garage Access Lighting
-  Existing Street Light



Lighting Plan - Gary Steffy Lighting Design

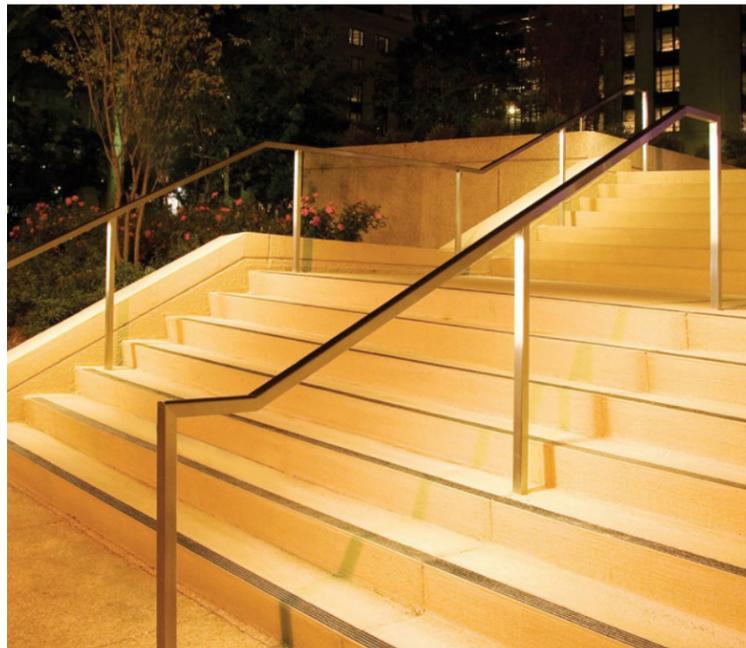




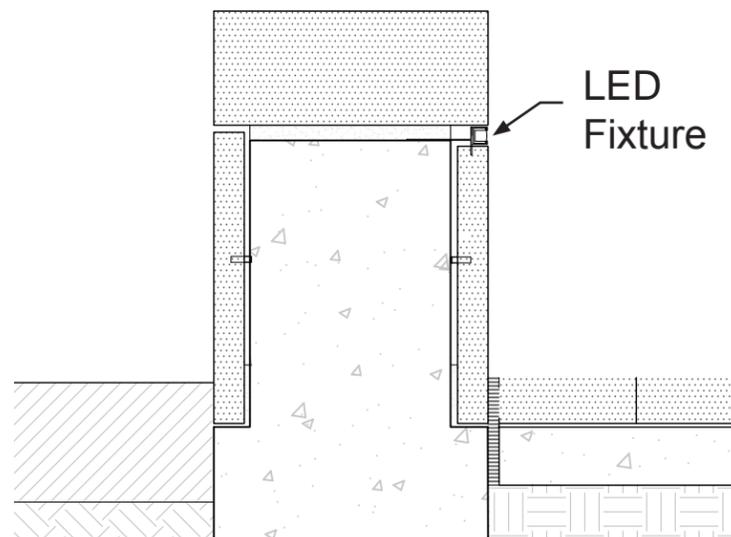
Southwest Corner - Gary Steffy Lighting Design Facade Concept



Smithsonian Institution
National Air and Space Museum



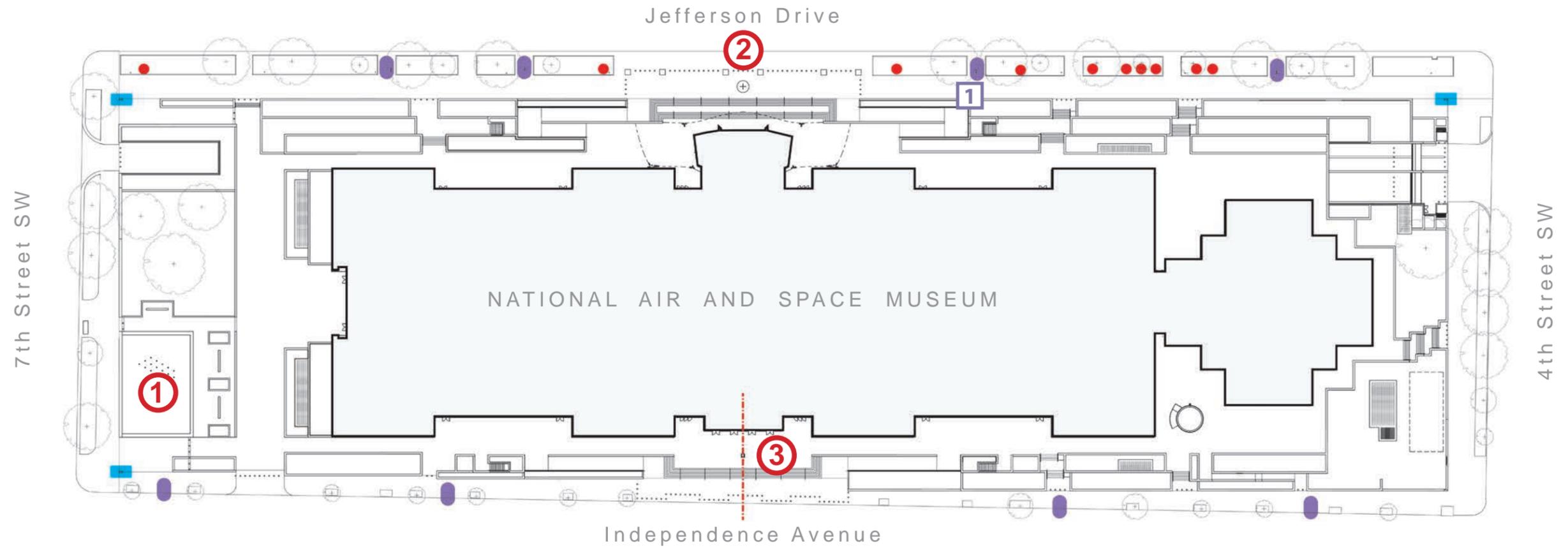
Illuminated Handrail



Linear Seat Wall

Lighting Detail - Gary Steffy Lighting Design





① Delta Solar



② Ad Astra



③ Continuum



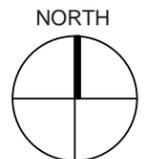
• Voyage Exhibition

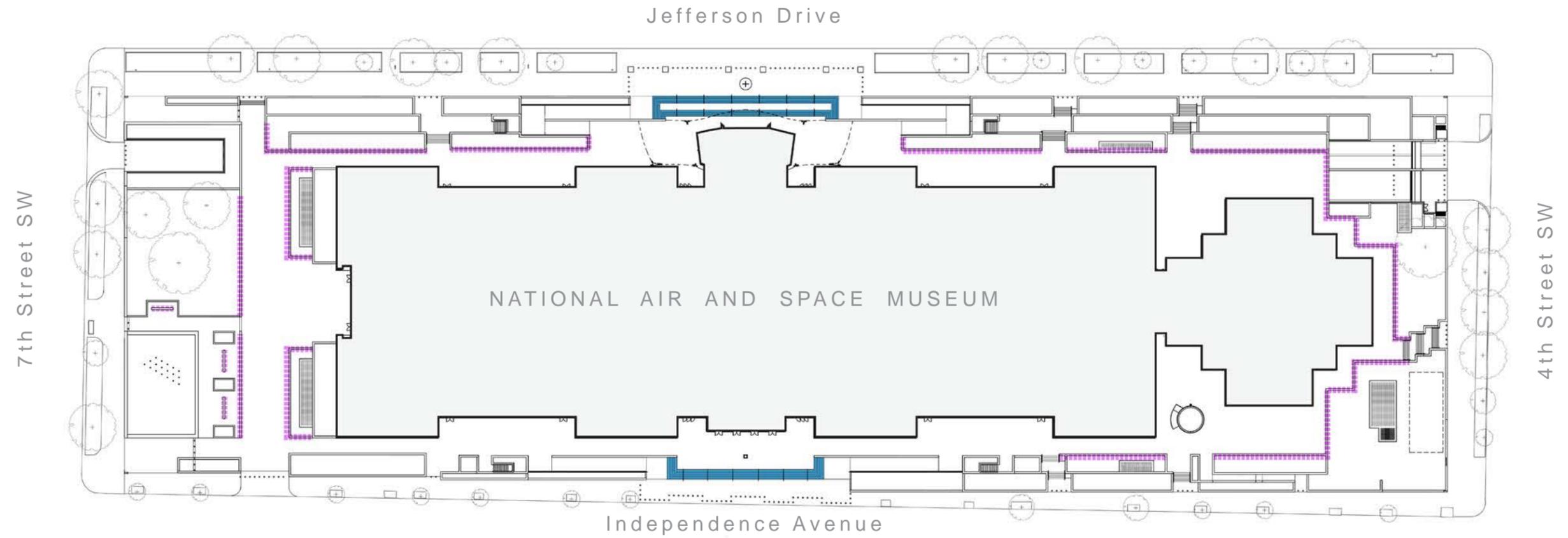


① T.S.C. Lowe Plaque - New position same location

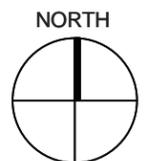
- ① Existing Sculpture Relocation/Proposed
- 'Voyage' Exhibit
- Wayfinding Signage Columns
- Exhibit Signage Columns
- Commemorative Plaques

Site Art - Exhibit - Interpretation



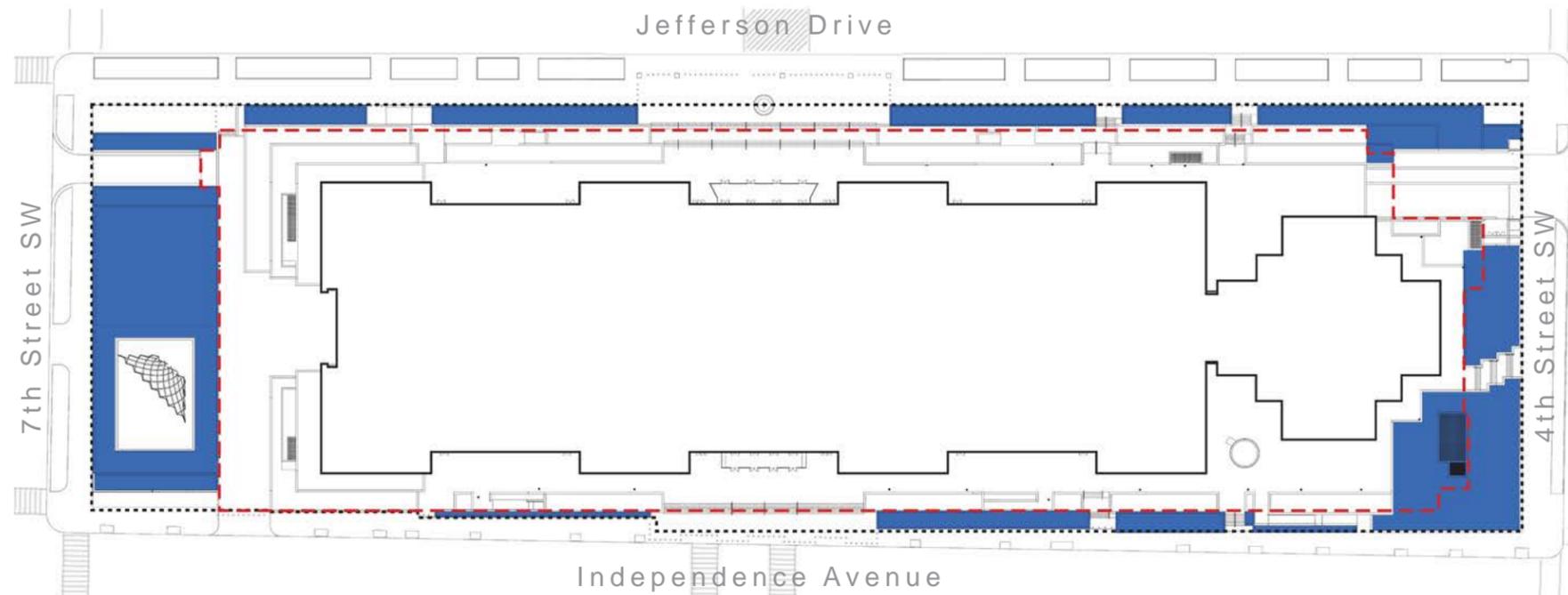


- Seat Walls
- Monumental Stair/ Informal Seating



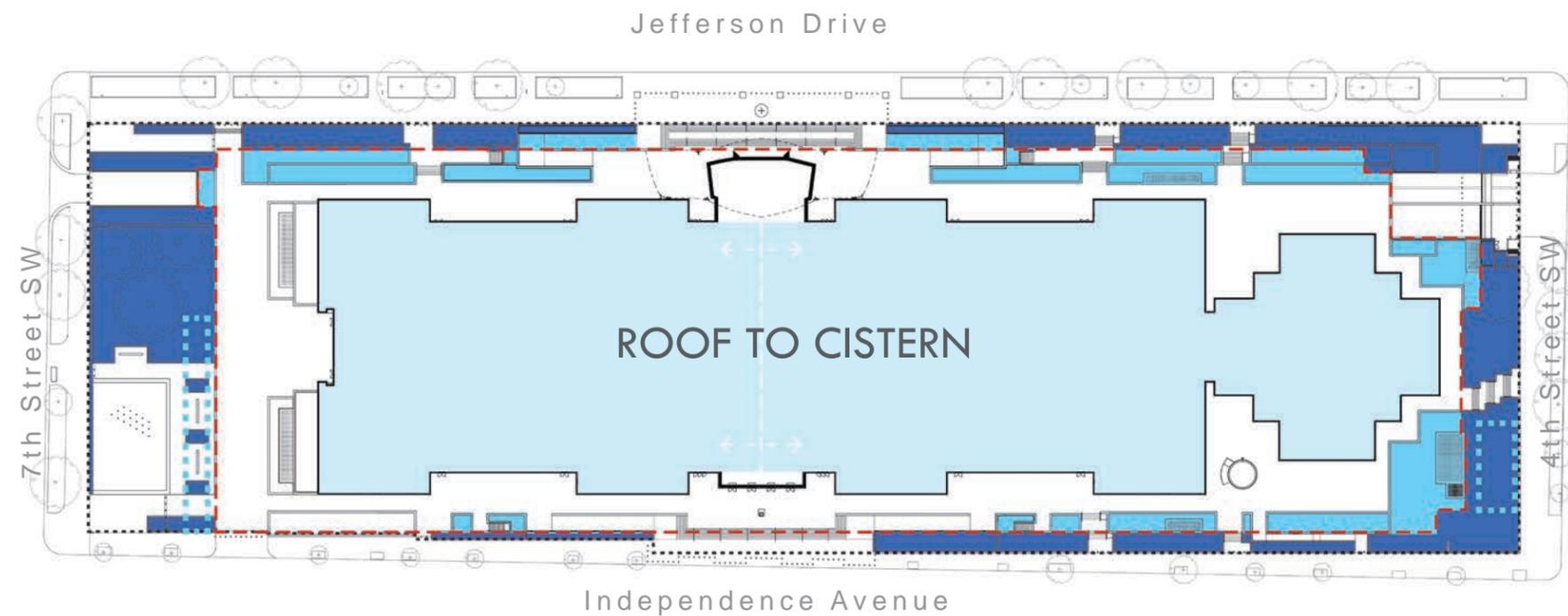
Seating Diagram



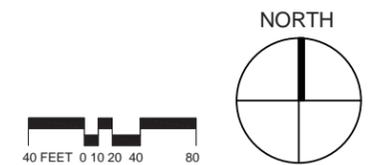


Existing Conditions

- Project Scope-of-Work
 - To City System
 - Cistern (for Greywater Re-use)
 - To Cistern
 - Stormwater diverted to ongrade infiltration
 - Ongrade Infiltration
 - - - Basement Edge of Structure
- (Note: 100 yr. storm overflow to city system)



Current Proposed Design



Stormwater Management Strategy



National Air and Space Museum Mall Building Revitalization



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Context	79
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Ground Plane Narrative	90
Ground Plane Planting Approach	94

PLANTING DESIGN



Tree Cover

The tree planting program closely follows the architectonic suggestions of the Master Plan, varying only in the development of a varied palette of tree species rather than favoring a single monoculture. Oak species are used as the backbone of the scheme, selected for their upright vertical habit and strong contrast to the Mall elms, and for their high ecological services in support of pollinators – birds and insects – of the ground plane plantings. The plan maintains a consistent rhythm on north and south sides of grounds.

Different palettes are applied north and south to help differentiate, clarify orientation, and to address greater insolation/heat issues on the south side. As specific examples of site sensitivity, black gum (*Nyssa sylvatica*) is used in planters not over structure on the north side, where they will be highly visible and have deep rooting opportunity. Again, two-winged silver bell (*Halesia diptera* var. *magniflora*) is applied as a consistent character smaller tree in situations 'closer' to the building, highlighting its habit and flowering characteristics against the backdrop of the building masonry. The design develops the east end grove as a diverse native setting, with thematic and ecological services highlighted in both canopy and understory trees. At the west end three magnificent willow oaks are preserved, made healthier with minor modifications to drainage, soil and renewal of the ground plane planting.

Minor offsets in the linear east-west planting of trees will guard against the monotony of a single row, helping to organize the variety of tree species into 'sub-sets' which fall into place against the rhythm of the museum's massing. Trees mark the architectural premise of the building and serve to underpin the human comfort zone created for its visitors.

A note on proposed tree quantities

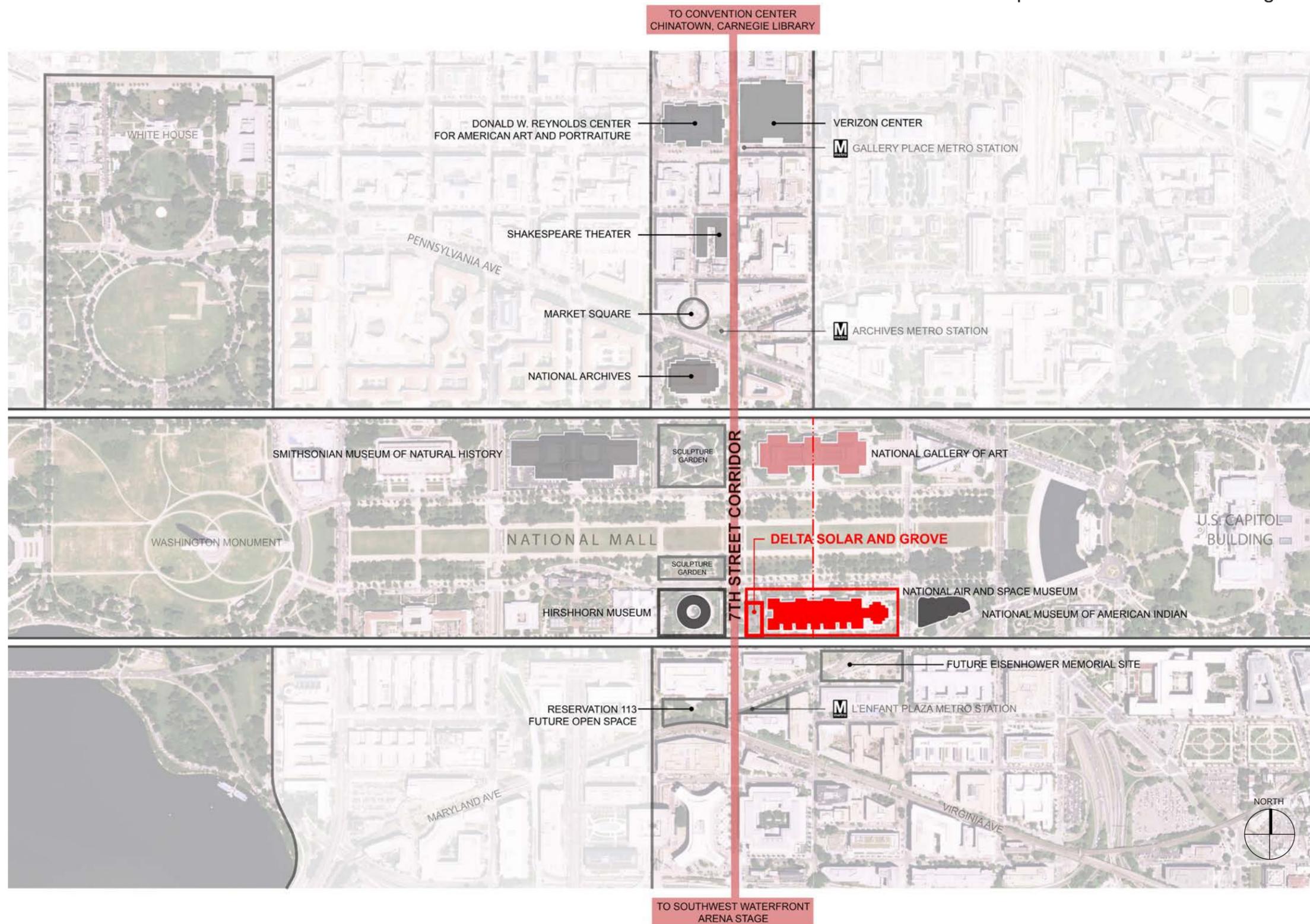
The current planting design proposes a total of approximately 405" of caliper DBH at installation. Shade trees will be installed at roughly 4" caliper and flowering trees at 2-3" caliper. The total quantity of all proposed trees is 119.

The total caliper of the 4 trees to remain is 121.5". Thus the total tree caliper at installation (proposed and existing to be preserved trees) is 526.5" at installation. An estimate of total caliper inches at maturity cannot reasonably be made, but as the number of large shade trees in the proposed scheme (55) far outnumbers the number of shade trees currently on the grounds (28), it can be fairly expected that total caliper tree inches will eventually exceed those of the current condition.

Total caliper of the 148 trees on the museum grounds (28 shade, 5 conifers, 105 small) to be removed is approximately 1,425" – most of these trees are at or nearly at maturity.

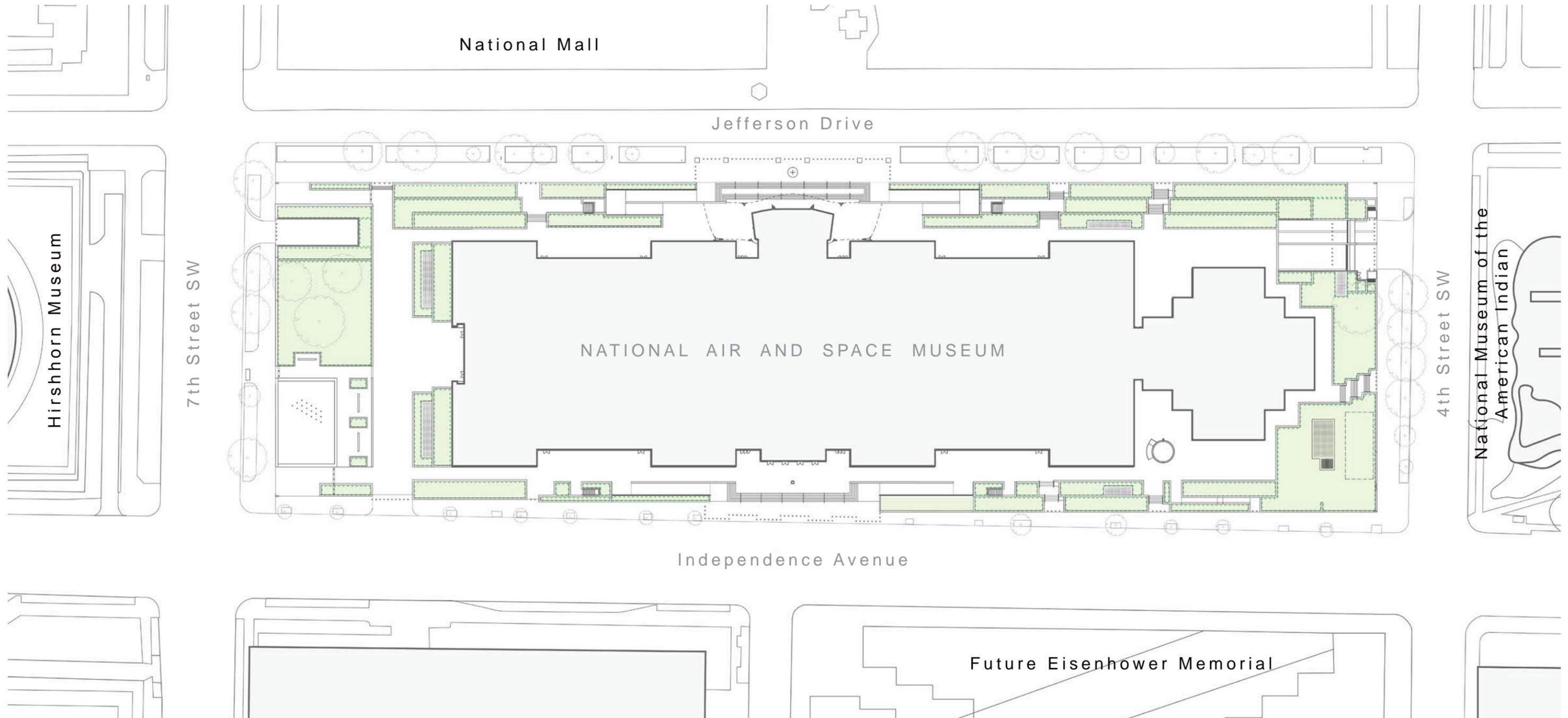
Planting Design - Narrative





Urban Context

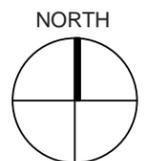


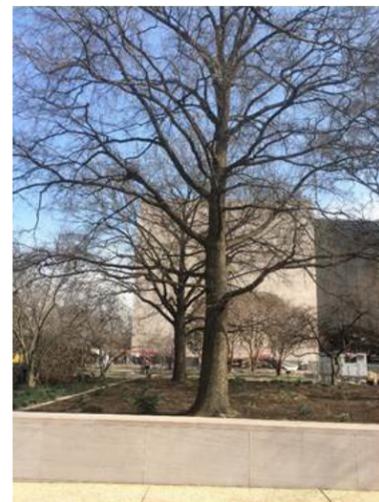
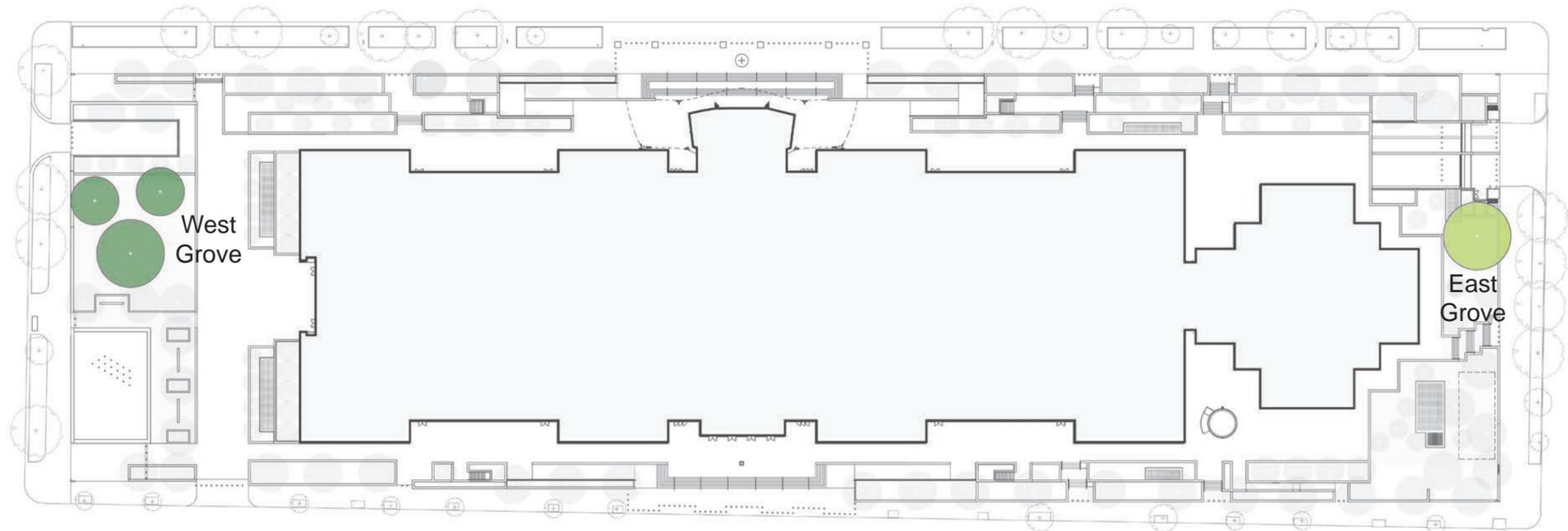


Local Context



Smithsonian Institution
National Air and Space Museum





#870 Willow Oak



#875 Willow Oak

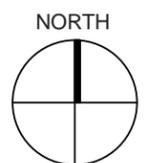


#880 Willow Oak



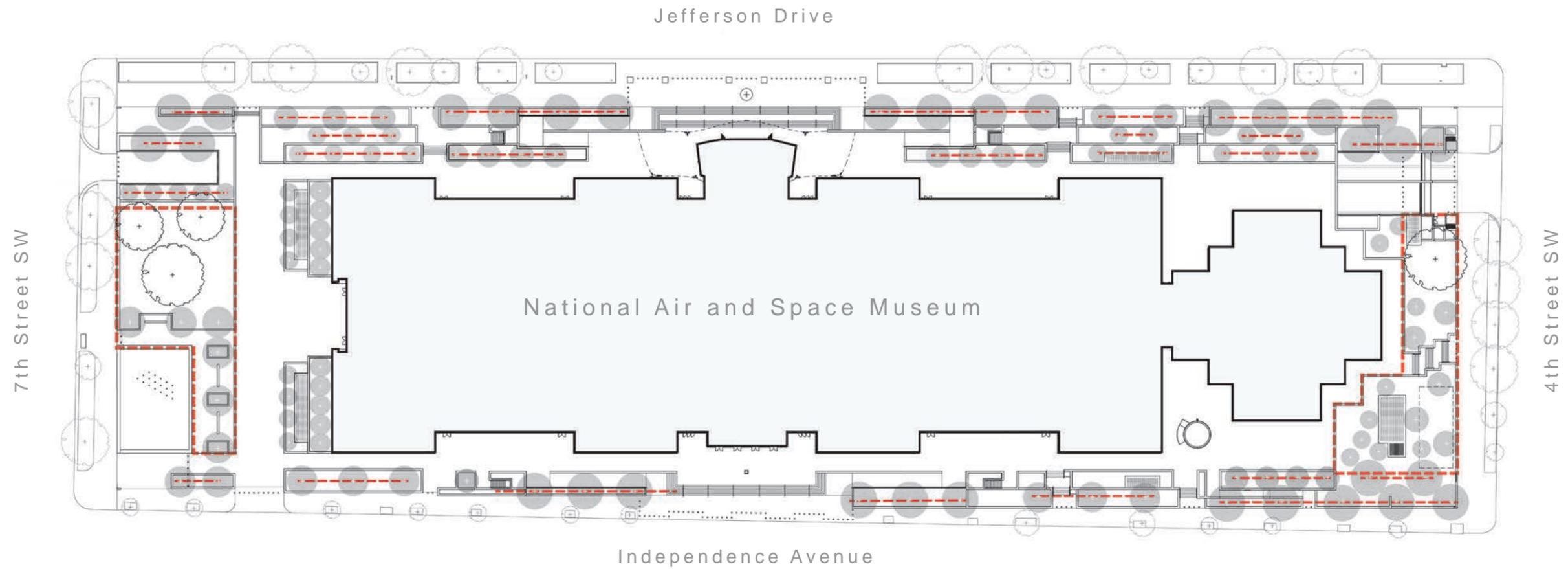
#2157 Scarlet Oak

-  Willow Oak (3)
-  Scarlet Oak (1)

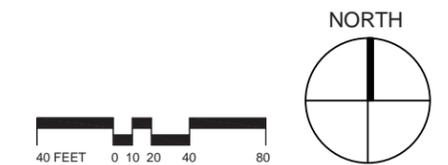


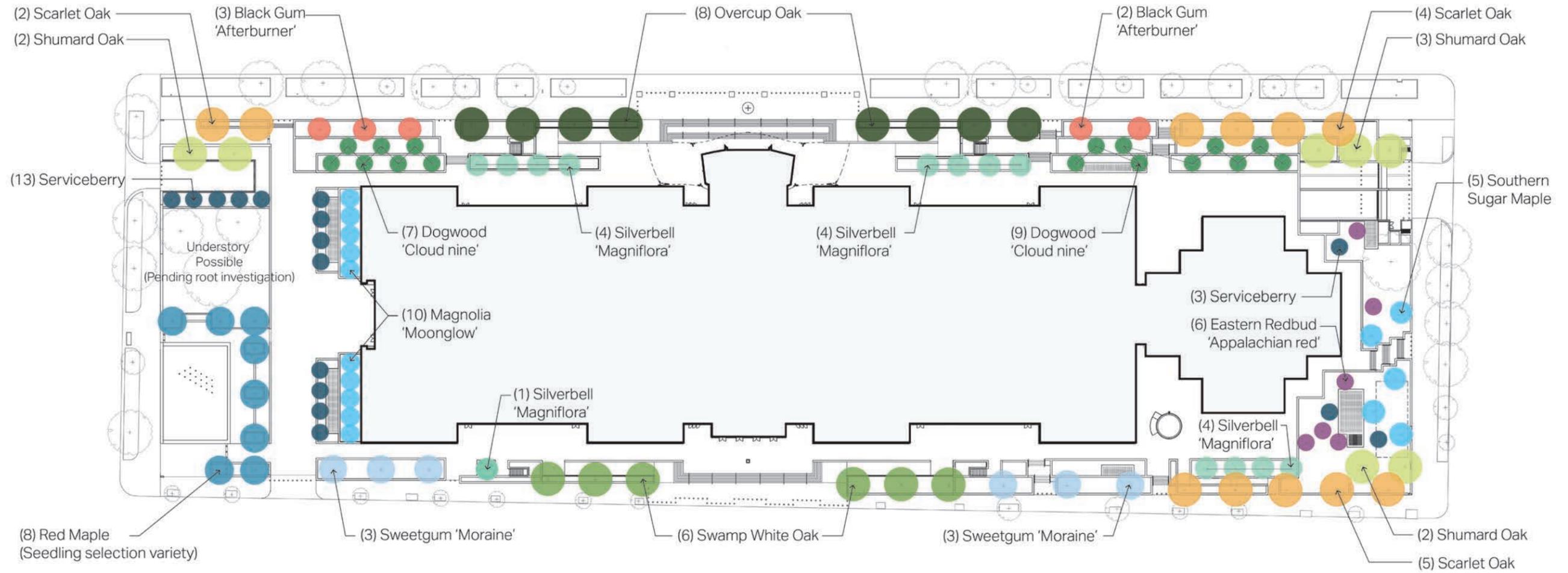
Existing Trees to Remain



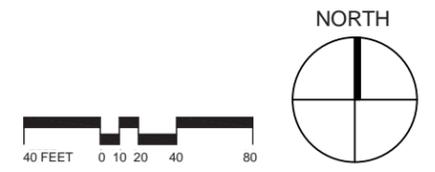


Tree - Structure



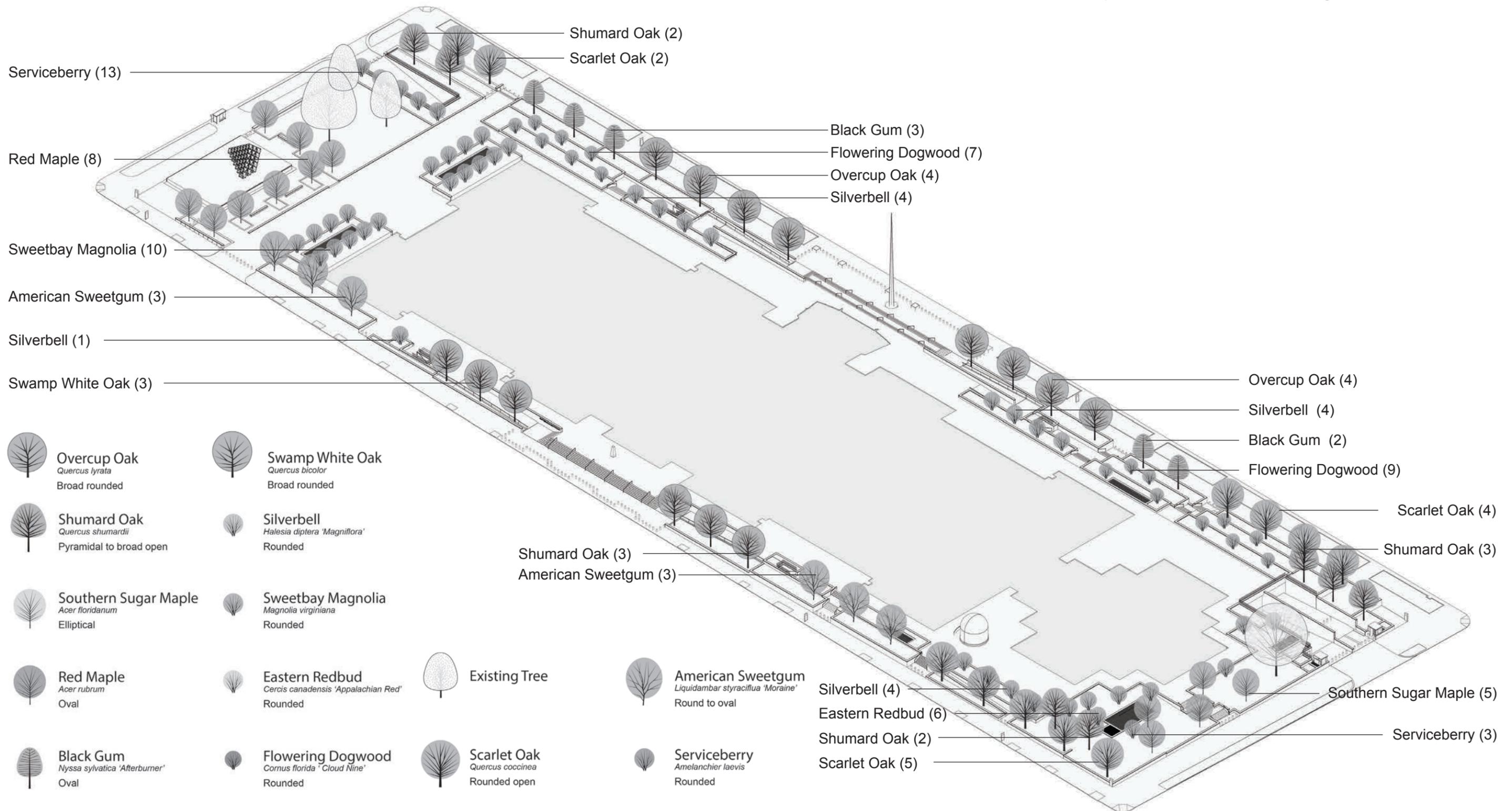


- | | | | | | |
|----|---|-------------------------|----|---|----------------------------------|
| 8 | ● | Overcup Oak | 16 | ● | Serviceberry |
| 6 | ● | Swamp White Oak | 13 | ● | Silverbell 'Magniflora' |
| 11 | ● | Scarlet Oak | 10 | ● | Magnolia 'Moonglow' |
| 7 | ● | Shumard Oak | 6 | ● | Eastern Redbud 'Appalachian Red' |
| 5 | ● | Southern Sugar Maple | 15 | ● | Dogwood 'Cloud Nine' |
| 8 | ● | Red Maple | | | |
| 5 | ● | Black Gum 'Afterburner' | | | |
| 6 | ● | Sweetgum 'Moraine' | | | |



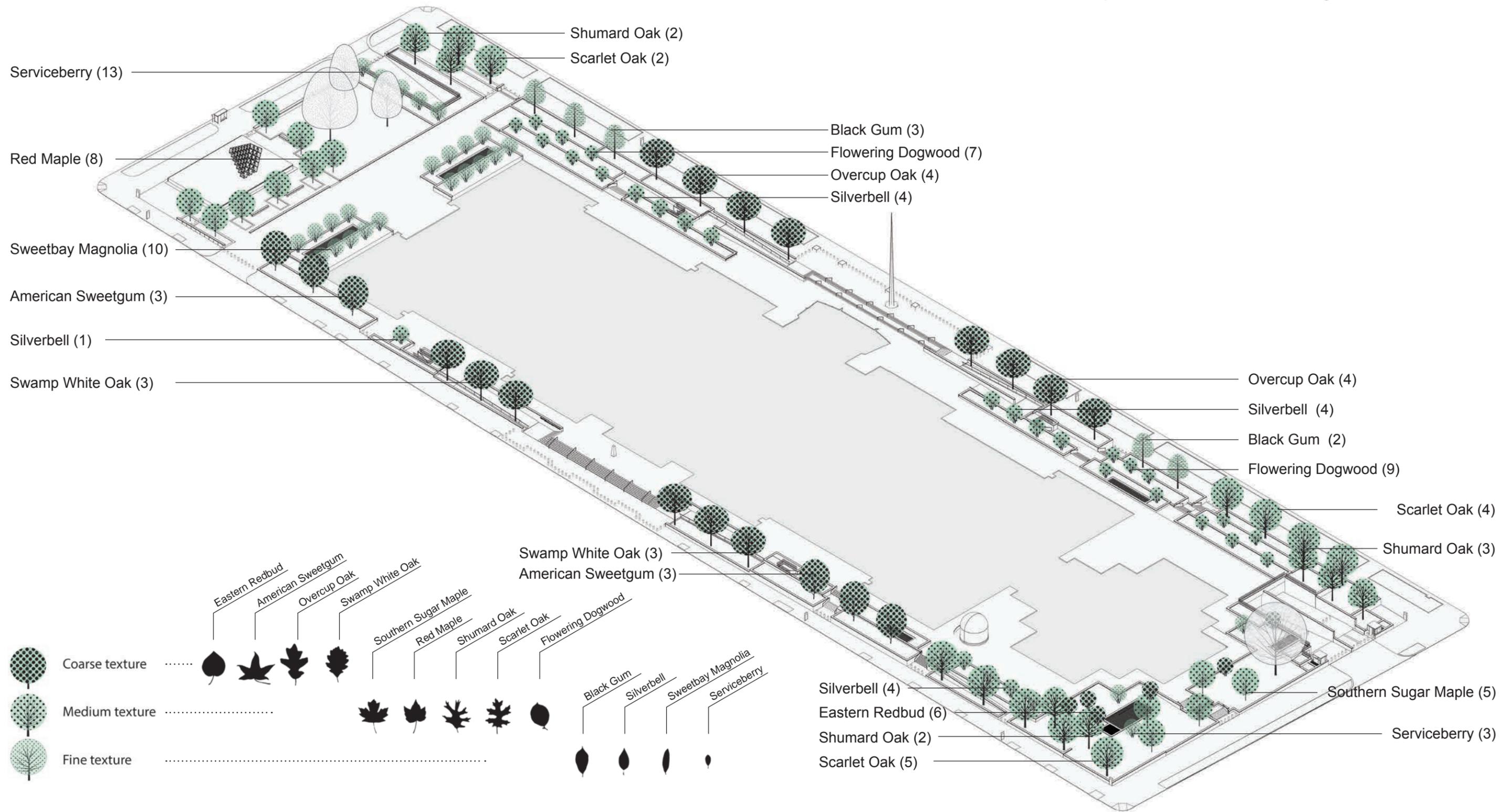
Tree - Species





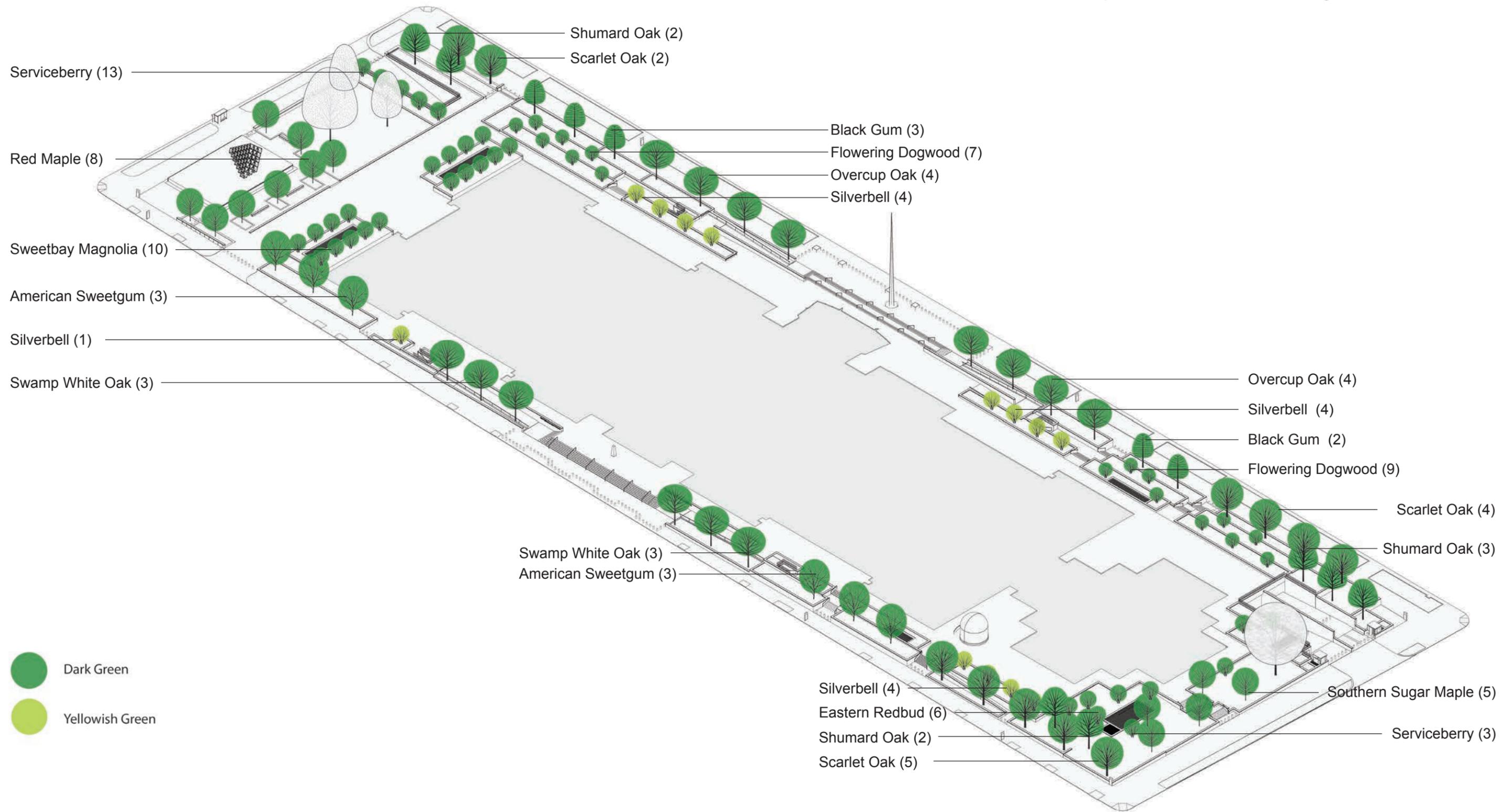
Tree - Habit





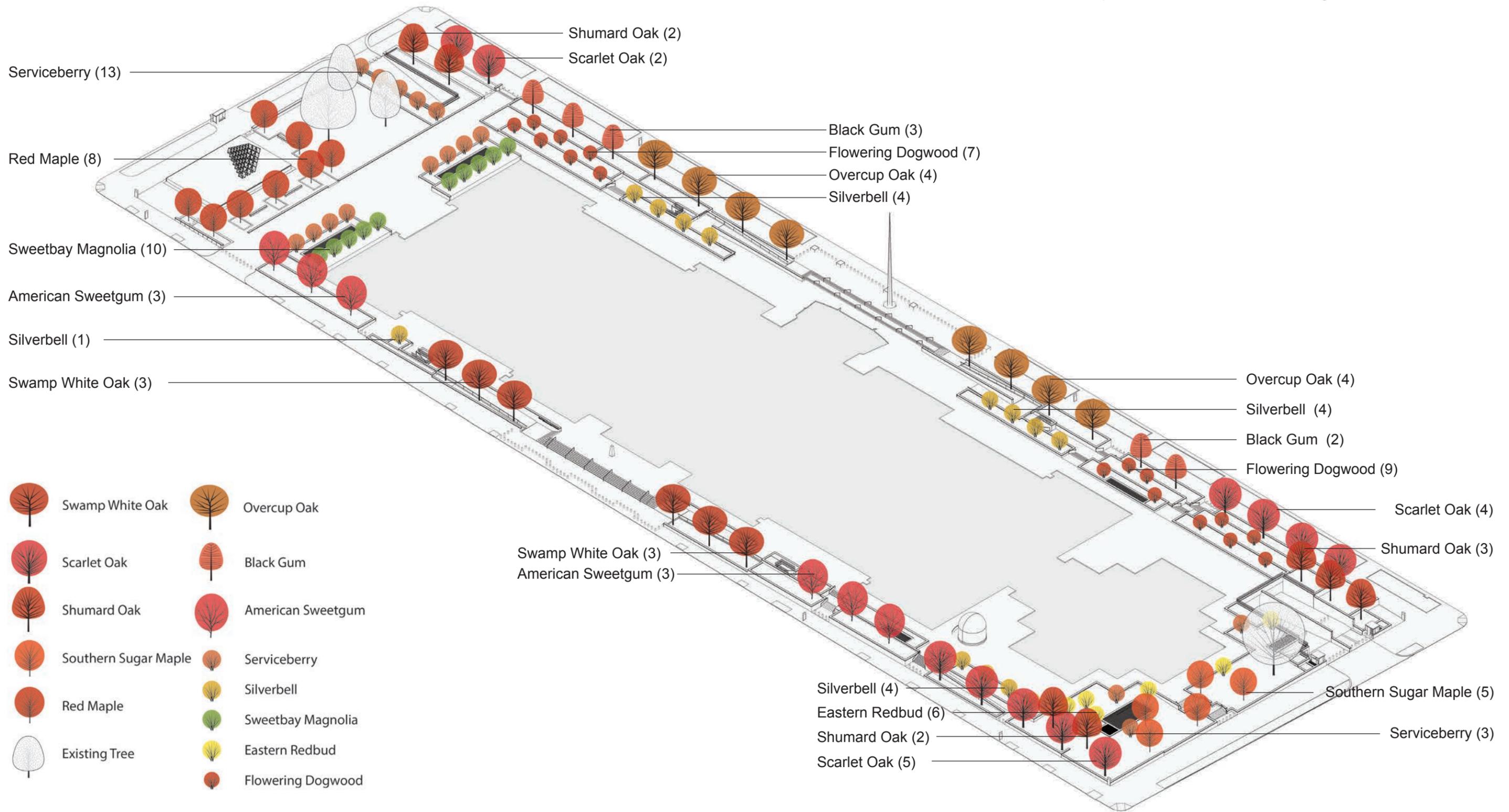
Tree - Foliage





Tree - Summer Color

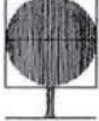
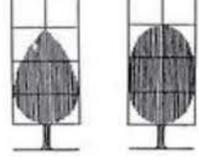
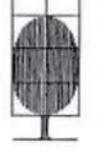
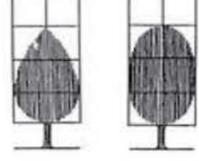
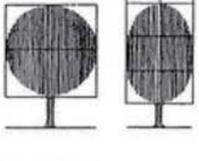
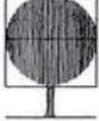




Tree - Autumn Color



CANOPY

NAME	LEAF	COLOR	FORM	STRUCTURE
Scarlet Oak <i>Quercus coccinea</i> Rounded open H*W: 50-70' X 40-50'				
Shumard Oak <i>Quercus shumardii</i> Pyramidal to broad open H*W: 40-60' X 30-40'				
Southern Sugar Maple <i>Acer floridanum</i> Elliptical H*W: 40-70' X 30-50'				
Red Maple <i>Acer rubrum (Seedling Selection Variety)</i> Oval H*W: 40-70' X 30-50'				
Black Gum <i>Nyssa sylvatica 'Afterburner'</i> Pyramidal, Maturing to rounded H*W: 30-50' X 20-30'				
American Sweetgum <i>Liquidambar styraciflua 'Moraine'</i> Round to oval H*W: 60-80' X 40-60'				
Overcup Oak <i>Quercus lyrata</i> Broad rounded H*W: 40-60' X 40-60'				

Swamp White Oak
Quercus bicolor
Broad rounded
H*W: 50-60' X 50-60'



SECONDARY

Serviceberry
Amelanchier laevis
Rounded
H*W: 15-40' X 15-40'



Silverbell
Halesia diptera 'Magniflora'
Rounded
H*W: 30-40' X 20-35'



Sweetbay Magnolia
Magnolia virginiana
Rounded
H*W: 10-35' X 10-35'



Eastern Redbud
Cercis canadensis 'Appalachian Red'
Rounded
H*W: 20-30' X 25-35'



Flowering Dogwood
Cornus florida 'Cloud Nine'
Rounded
H*W: 15-30' X 15-30'



Tree - Summary Character





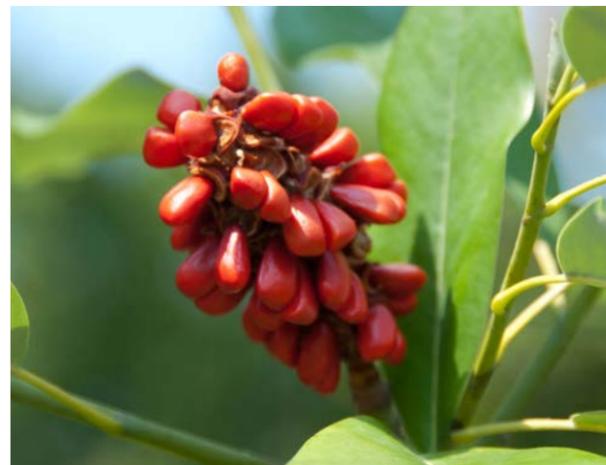
Squirrel - *Quercus*



Samara - *Acer rubrum*

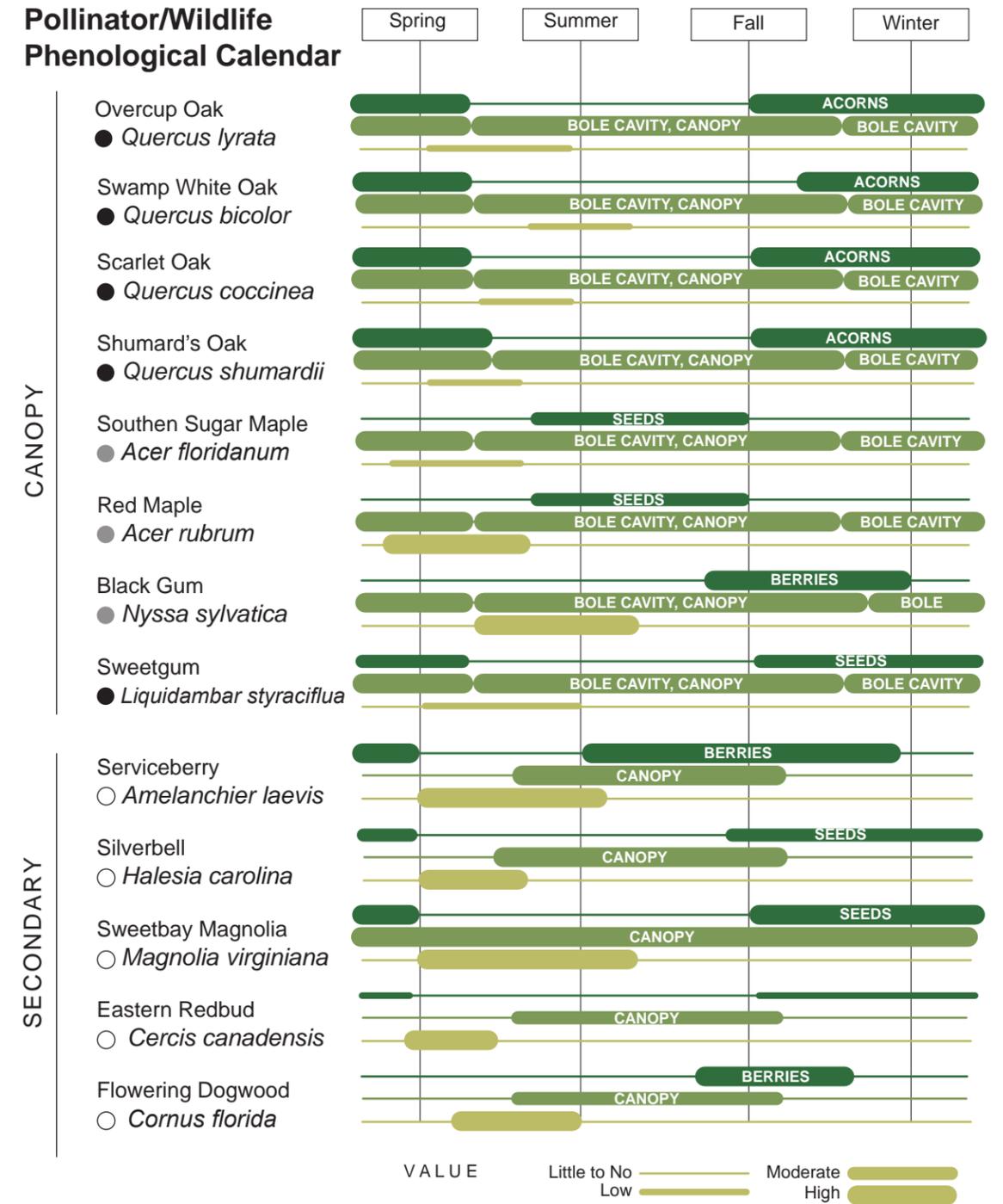


Cedar Waxwing - *Amelanchier*



Seed - *Magnolia virginiana*

Pollinator/Wildlife Phenological Calendar



CO₂ SEQUESTRATION

- High (100-180 lbs/per yr)
- Moderate (40-100 lbs/per yr)
- Low (>70 lbs/per yr)

FORAGE (birds, mammals)	POLLINATOR (habitat/larva host)	POLLINATOR (forage)
-fruit -seeds	-canopy, leaves -bole cavity	-nectar -pollen

Trees - Ecological Services



Ground Plane Planting Design

Principles

The planting design for the ground plane of the National Air & Space Museum follows three organizing principles: structure, function, and theme(s).

Structure

The ground plane is structured around a perennial species palette focused on renewing and robust species adaptable to the planter regime of the museum environment, solar orientation and insolation realities, and to low height objectives in order to preserve and guide views into the grounds and towards the museum building and its entrances.

Function

There are several key functions for the ground plane planting plan. The plan creates a robust, year-round, highly seasonal herbaceous expression, covering all earthen surfaces of the grounds. It develops the NW, NE and SE entrance corners with similar, identifiable and distinct character species. The SW corner, with the Delta Solar sculpture as its focus, has its own unique planting regimen.

The design is conceived to create interest at the point of visitor approach and orientation. Entrance points to the grounds are planted with species hardy enough to both make and take more attention, animating entrances with attractive presentation and character. Placement and massing of taller species is managed so as to preserve visual access to site and building and introduce some rhythm, background, and scale connectivity to the massing of the building. The ground plane planting design is based on providing a rich variety and diversity of species, increasing the viability of an ecological web along with a variety and unity of color, texture, habit, foliage and smell – in this way creating a rich tapestry in counterpoint to the singularity of the building.

Themes:

Nature is the Inspiration

The museum is the repository of many great stories. Flight, discovery and inspiration flavor many, if not all, of them. This is a place with a particular spirit, one based in discovery and inspiration, perseverance and bravery.

The garden and grounds provide a venue to examine nature's role in the inspiration for human flight. The design proposes to reveal the 'flight' identity of plants, insects and birds, and the 'ready-at-hand' technologies that exist in nature and provided direct inspirations for invention. The temporality of life and the role of time in physics are fundamental to explaining and designing for air and space exploration. The design seeks to reveal the seasons, the arc of the sun, the direct way in which physics and the cycle of life play out over time, influencing and directing human decisions, plans and outcomes.

Life is complex, diverse

Complex systems design and redundancy are fundamental to the survival of life on the planet, and for humans in the air and in space. 'Platform' stability is invaluable – underpinned by a wide, diverse and generous base. Here, the planting plan harnesses:

- The interrelatedness of all things
- The idea of complex technologies – the multiple related, redundant, and integrated systems necessary for flight or survival in space - as revealed in nature by the diversity of plant life, the ecosystem web, and the movement of resources: water, energy, nutrition, oxygen and carbon dioxide... the dispersal of seeds and thereby, the prolongation of life
- The unity and integrated nature and aesthetics (design) of a fully explored and developed planting palette and layout

Life is context-specific

The Air & Space Museum has many site-specific site conditions which create a specific environmental context for plant life success, just as the context of flight and space travel are conditioned by contextual challenges. The regional life-supporting ecological platform (a bit of 'spaceship Earth') of the Mid-Atlantic/Metropolitan/Mall locale create the conditions for certain plants in certain places – planting design is context-specific, as are aeronautical and space engineering.

Ground Plane Design Parti

Influences and Scales

Make context, monumentality and human scale work together across contextual influences and scales, across the grounds as a unity and into each planter. Respect the monumentality and cultural significance of the museum. Consider the rigor and reality of orientation, exposure and microclimate (and design soil, water supply and planter environment to respond to these realities).

Animation

The planting design proposes a constantly changing and purposefully choreographed and animated environment. It is diurnal, seasonal, and annual, seizing on the traits and habits of bird and insect flight and movement, seed and foliage flight, the growth and diminishment of plant structure, foliage, and flowering over time. The annual and diurnal path of the sun is integral to establishing the palette and its disposition

Groundplane Planting Expression

The design and palette seek to reveal the themes with a readily accessible and understandable display of diverse plant and site attributes:

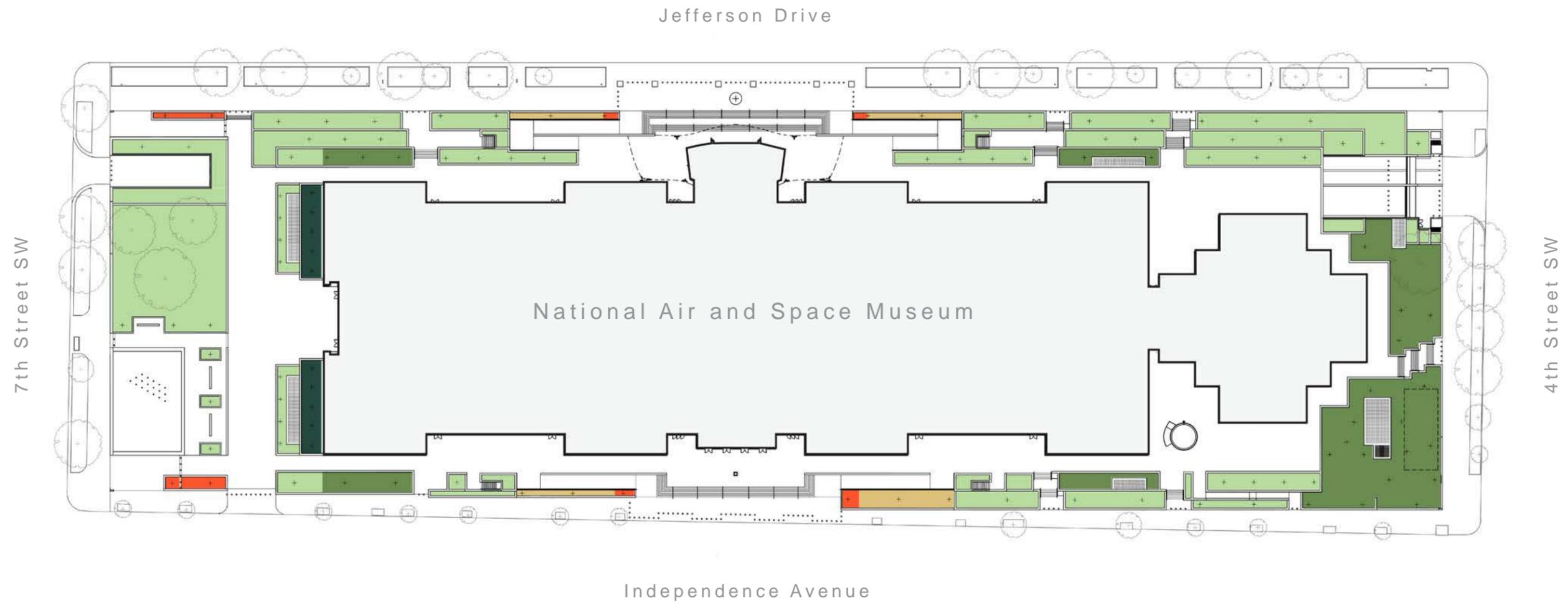
- Height
- Structure and habit
- Mass and density
- Visual porosity
- Texture
- Flowering timeline, color,
- Foliage color and character over time:
- Saturation, density, tone, reflectivity, movement
- Kinetics: plants and animals – flight; diurnal and seasonal; celestial; human movement

The design creates a visually-arresting and NASM-specific (planting design) aesthetic. There is a syncopated approach to expression. An animated layout of the planting palette, both within the planter and across planters - in which each planter 'recognizes' relationships within the larger canvas of the Museum Grounds – serves to unify and differentiate the length and breadth of the grounds. This is an ordered, varied and environmentally-responsive planting display featuring primarily native plants.

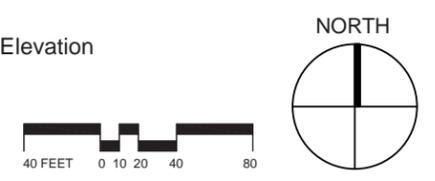
Please refer to the images following.

Ground Plane Narrative



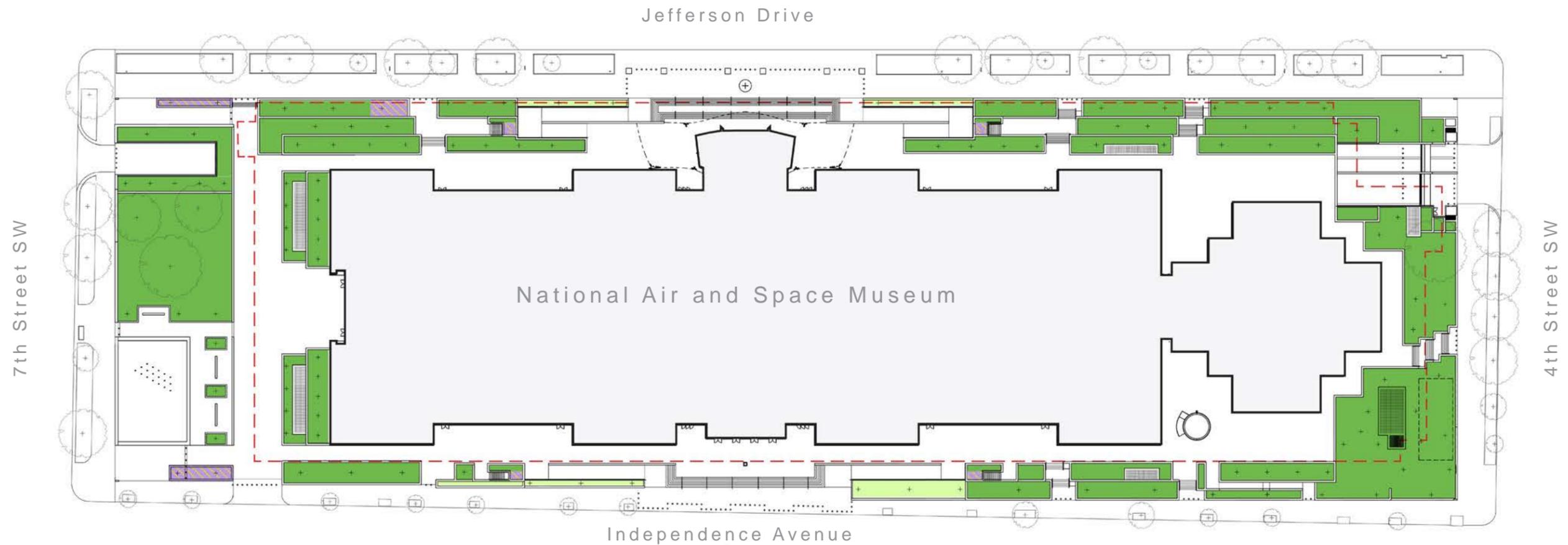


- Entry: At-Grade Planter
- Slope: At-Grade Planter
- Low planting (Preserve sight lines)
- Potential for taller planting
- Taller planting adjacent to wall at West Elevation

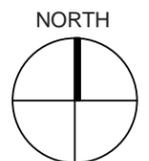


Ground Plane - Planter Typology



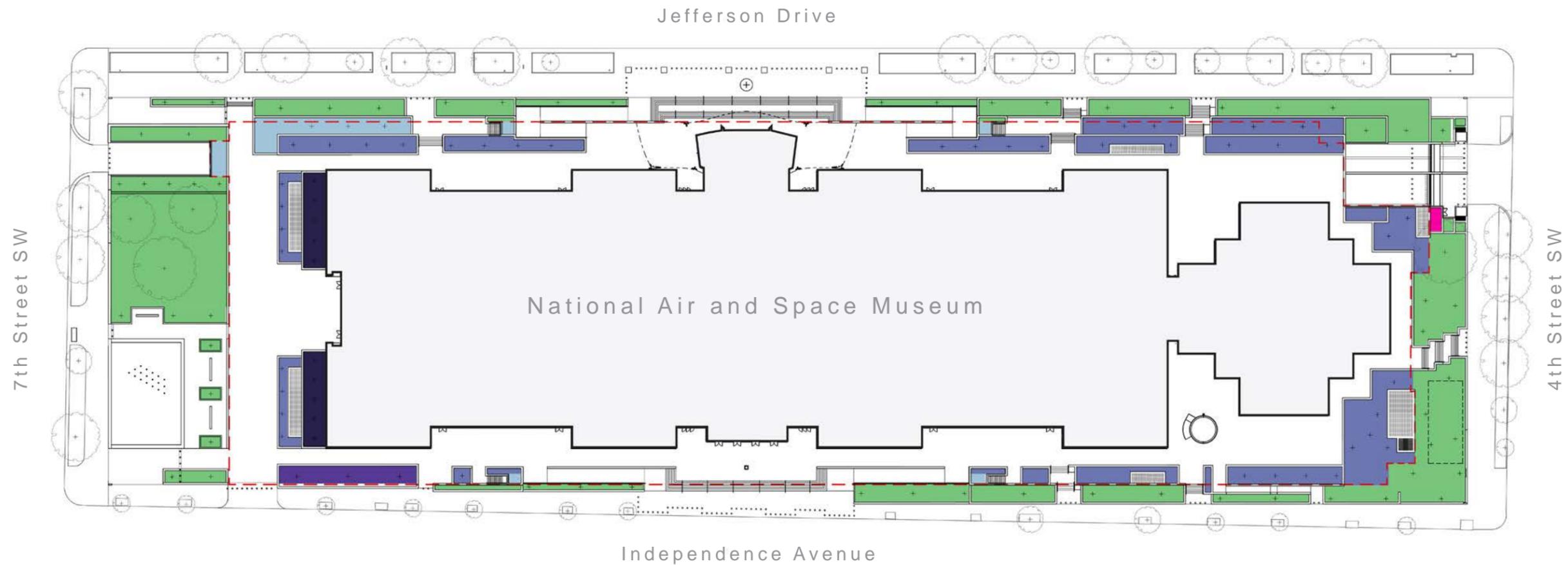


- Basement Edge of Structure
- Lower than Existing
- Same as Existing
- New Planter



Ground Plane - Planter Heights





On Structure

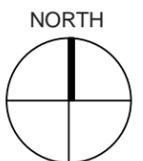
- TBD Green Roof
- 24" Planting Soil Depth
- 32" Planting Soil Depth
- 44" Planting Soil Depth
- 52" Planting Soil Depth

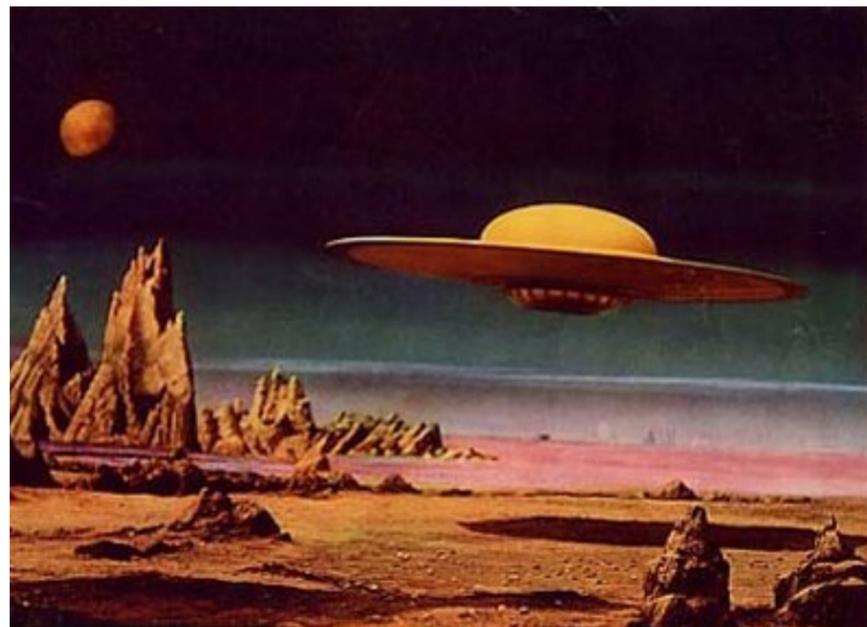
On Grade

- Planting Soil Depth

Basement Edge of Structure

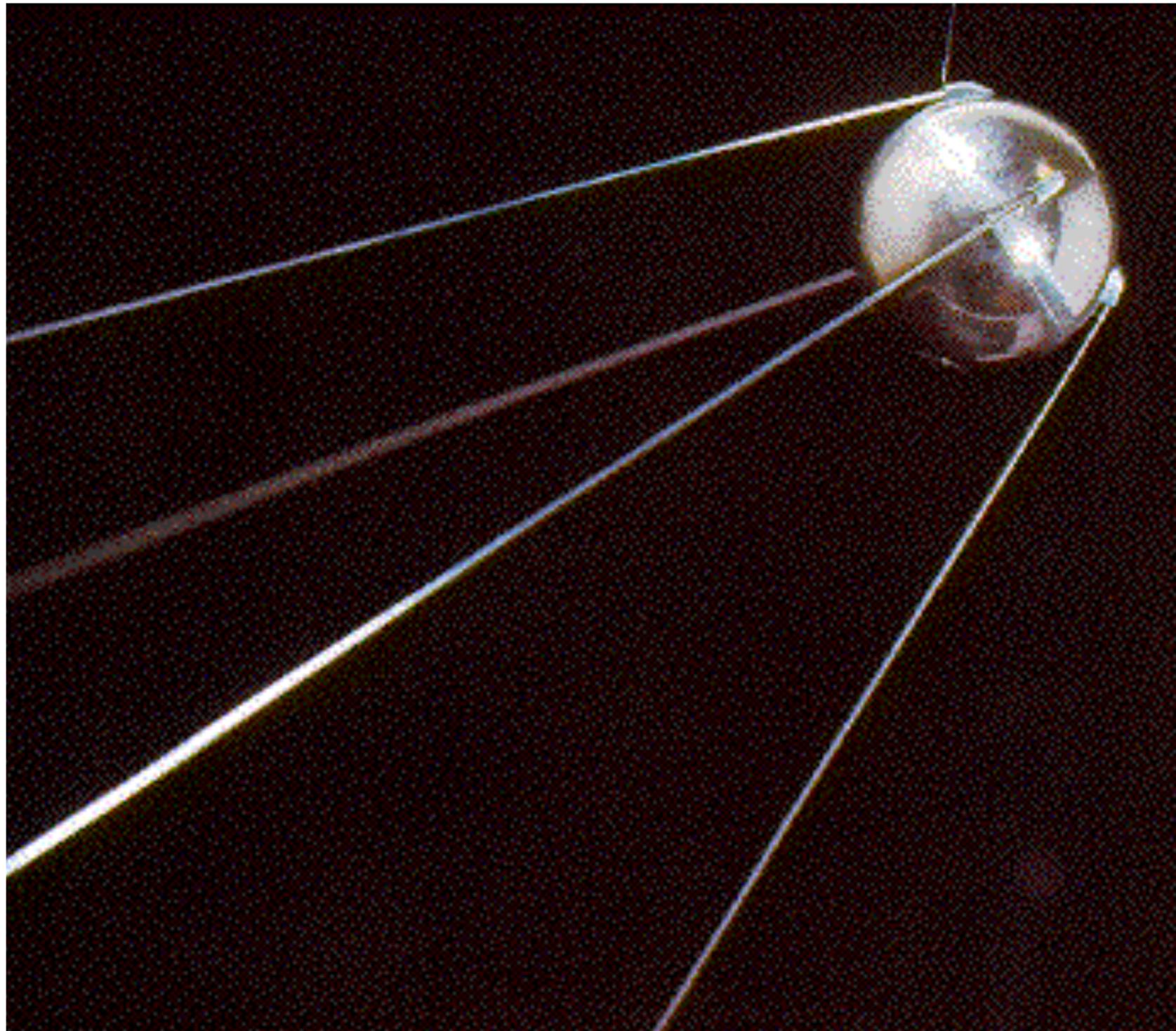
Ground Plane - Planter Soil Depth





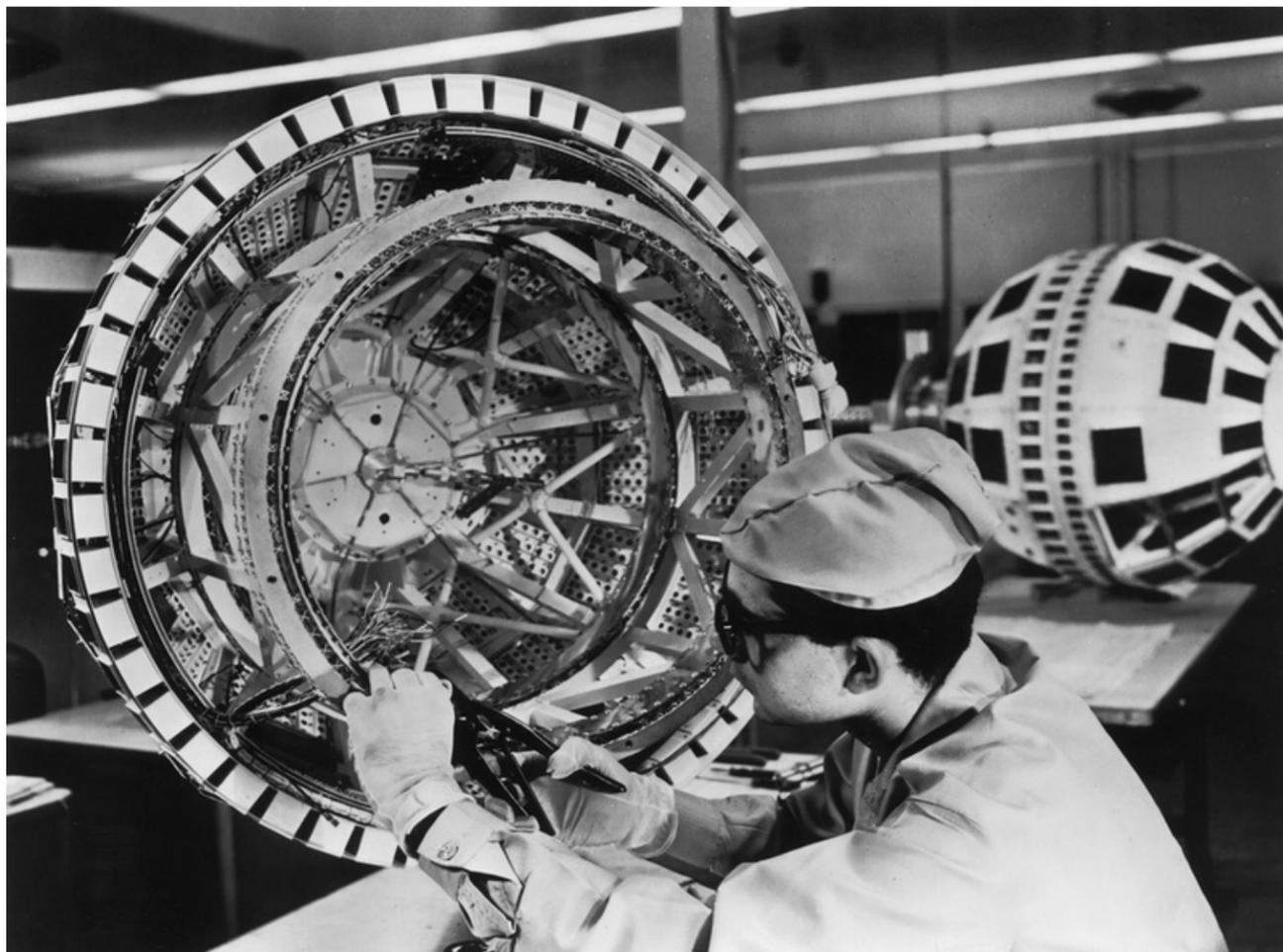
Ground Plane / Planting Approach - Aeronautical structure of plants





Ground Plane / Planting Approach - Aeronautical structure of plants





Ground Plane / Planting Approach - Aeronautical structure of plants





Dynamic Character of Plants - Thimbleflower





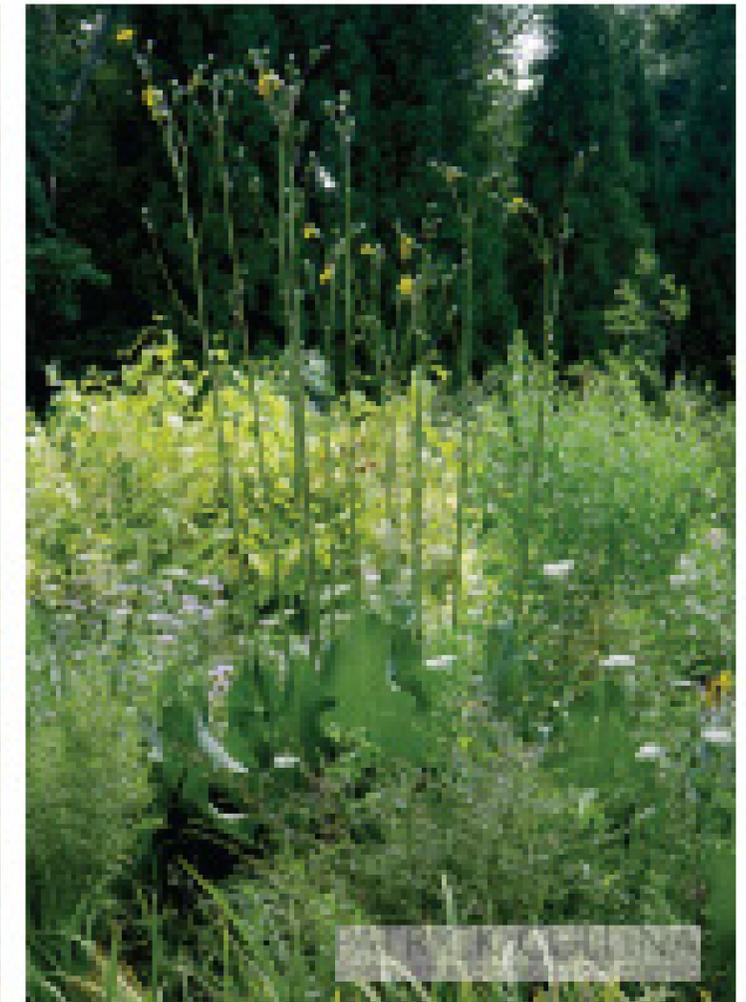
Dynamic Character of Plants - Butterflyweed





Dynamic Plantings - Habitat for Flight-Driven Creatures





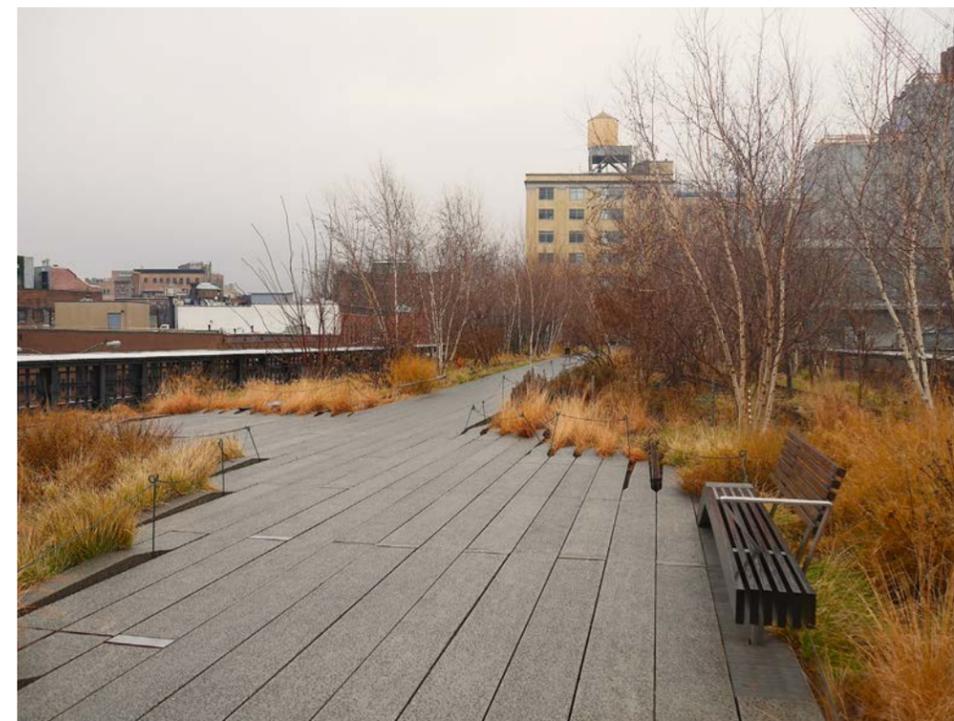
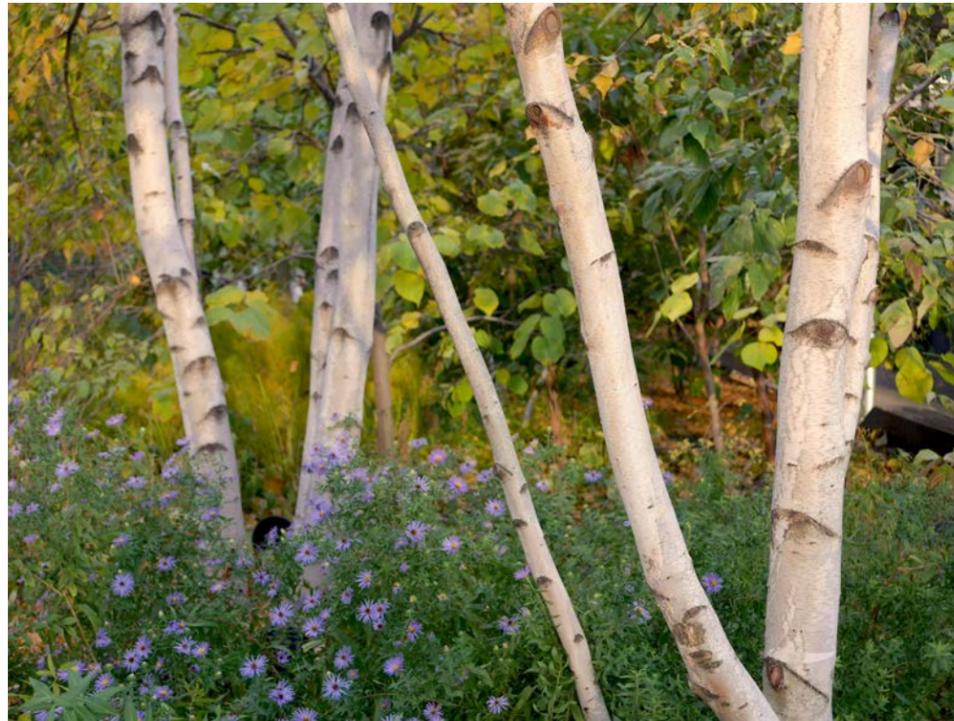
Dynamic Plantings - Vertical Elements Pierce Ground Plane Sequentially/Seasonally





Dynamic Plantings - Varying Degrees of Complexity Anchored by Grasses/Foliar Texture Plants





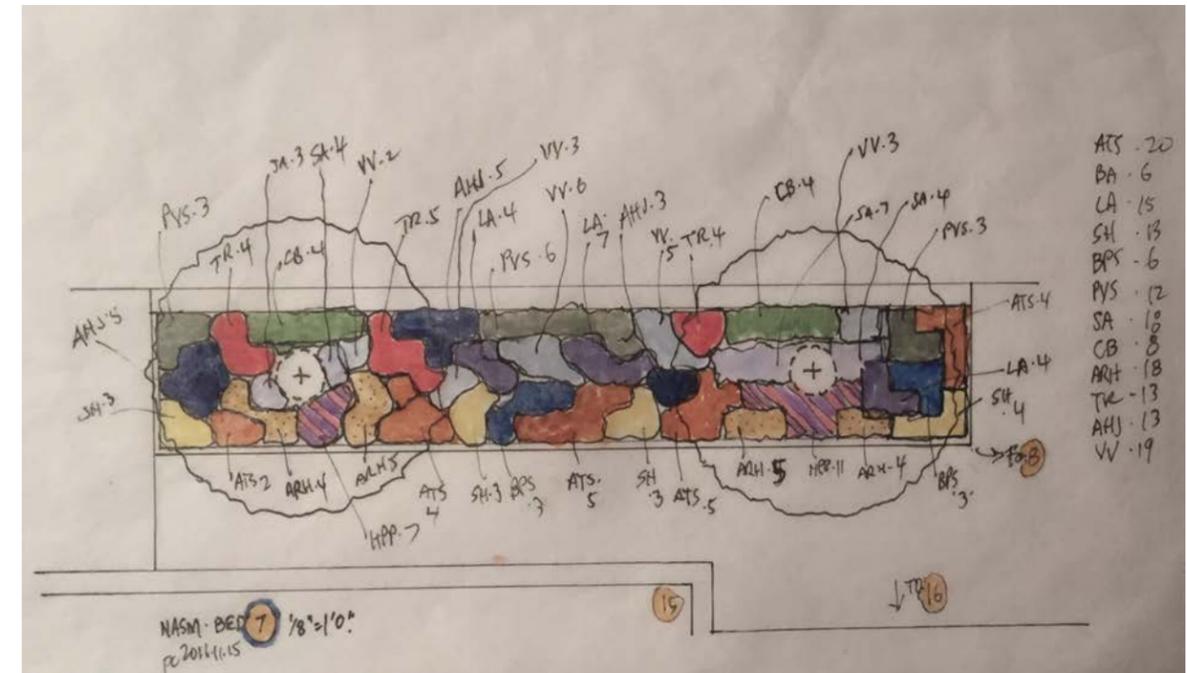
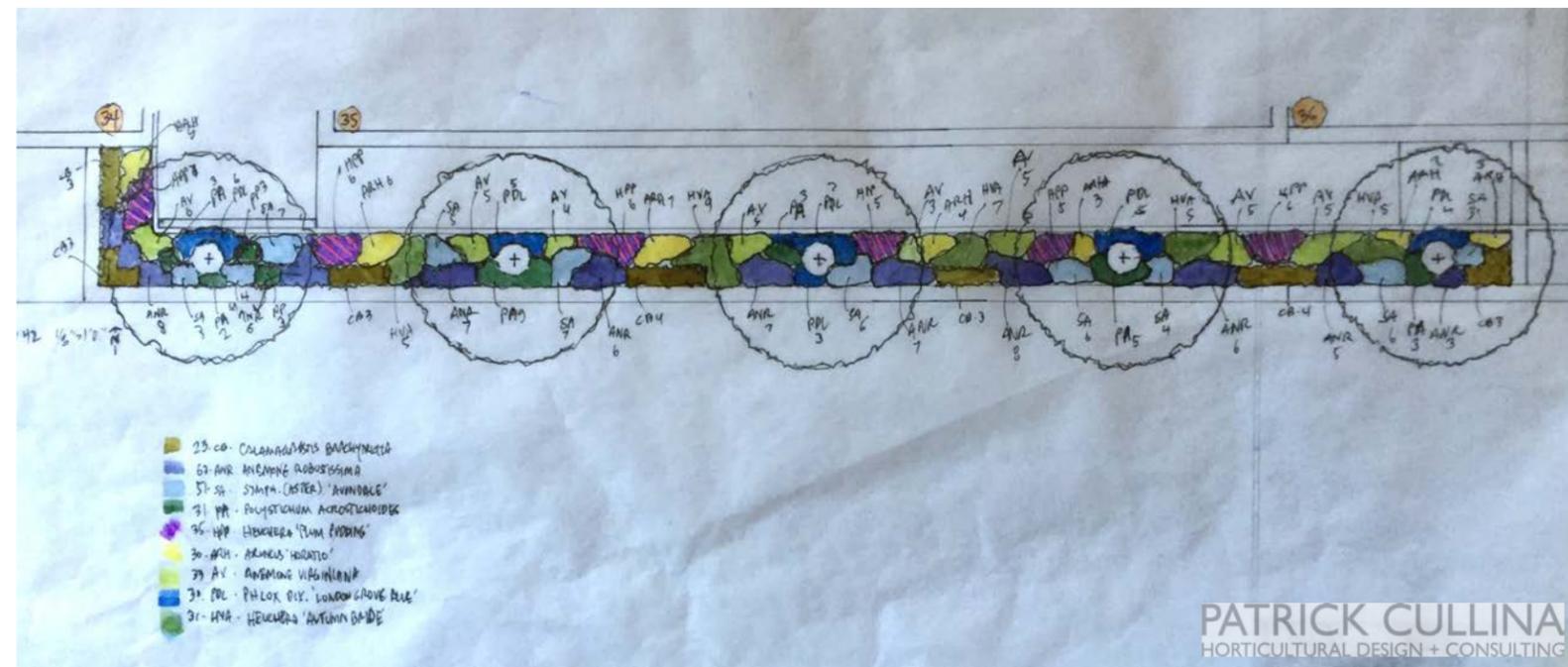
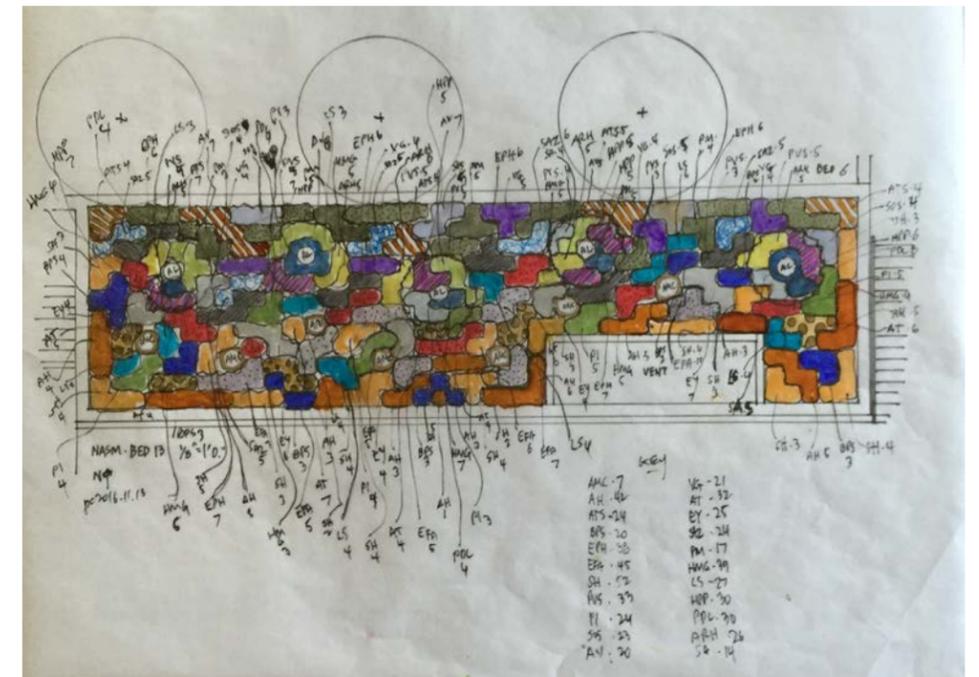
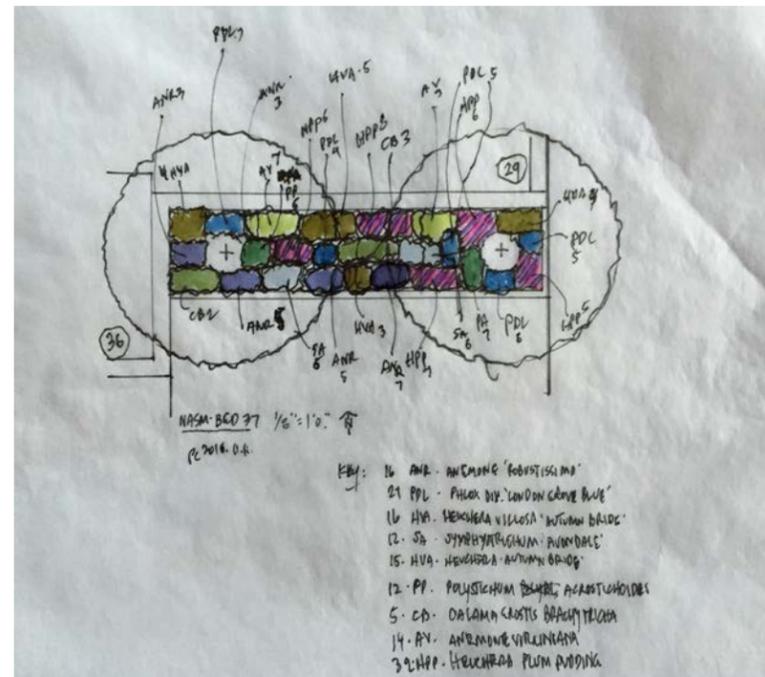
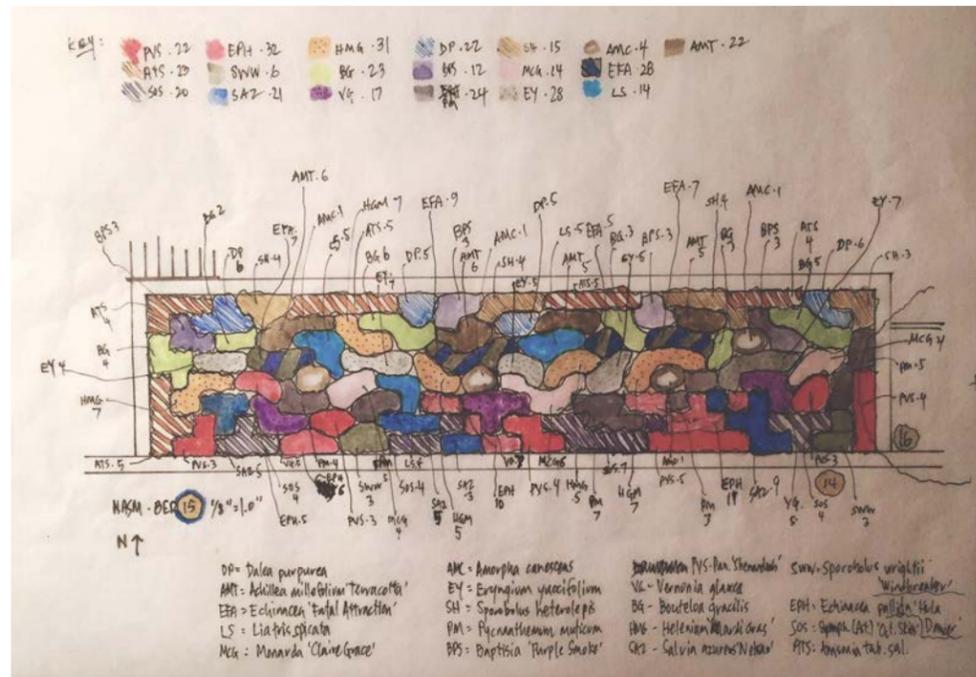
Dynamic Plantings - Seasonal Progression





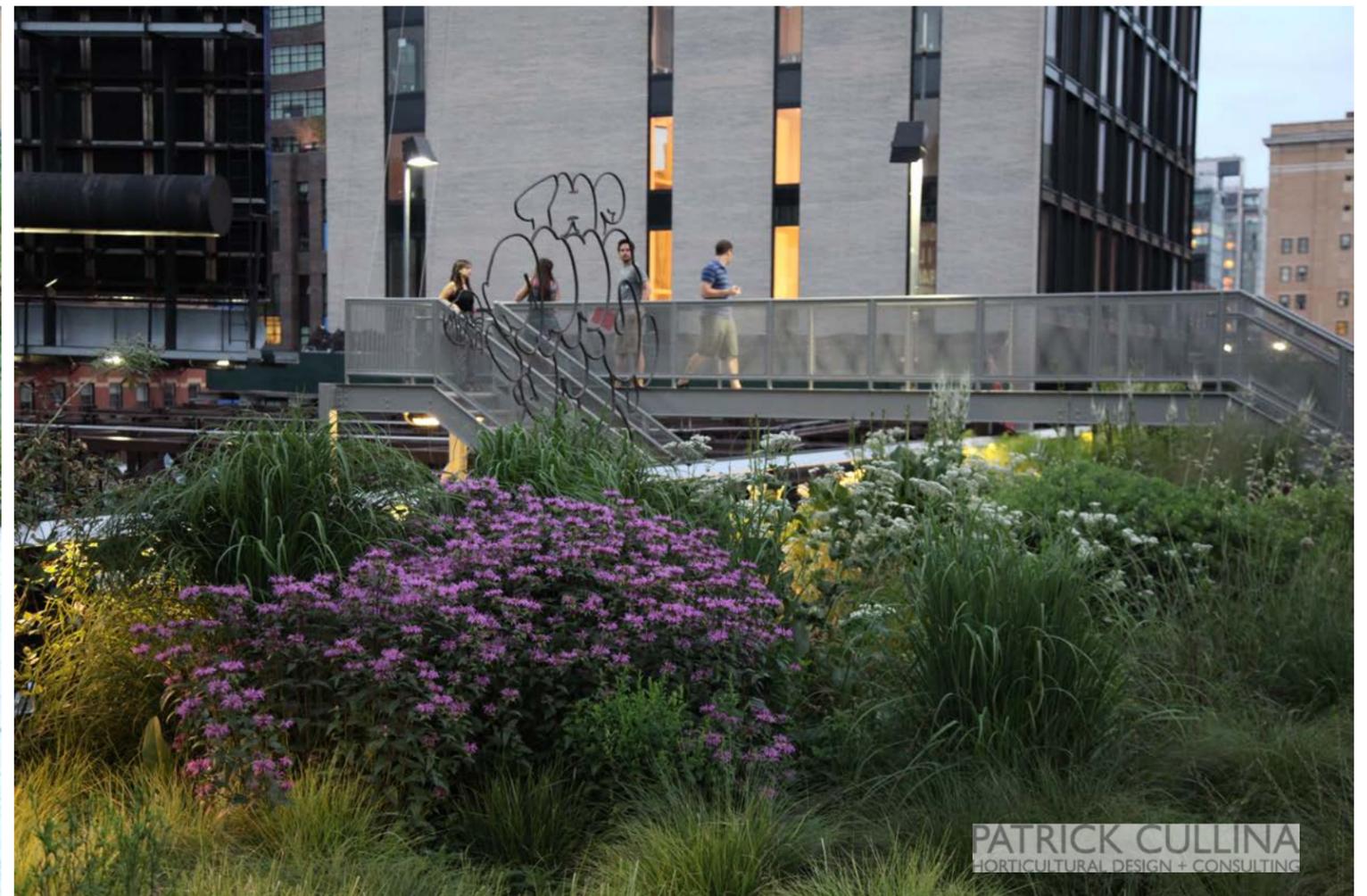
Dynamic Plantings - An Immersive Habitat for People and Pollinators Alike





Sample Planting Study Sketches for Ground Plane





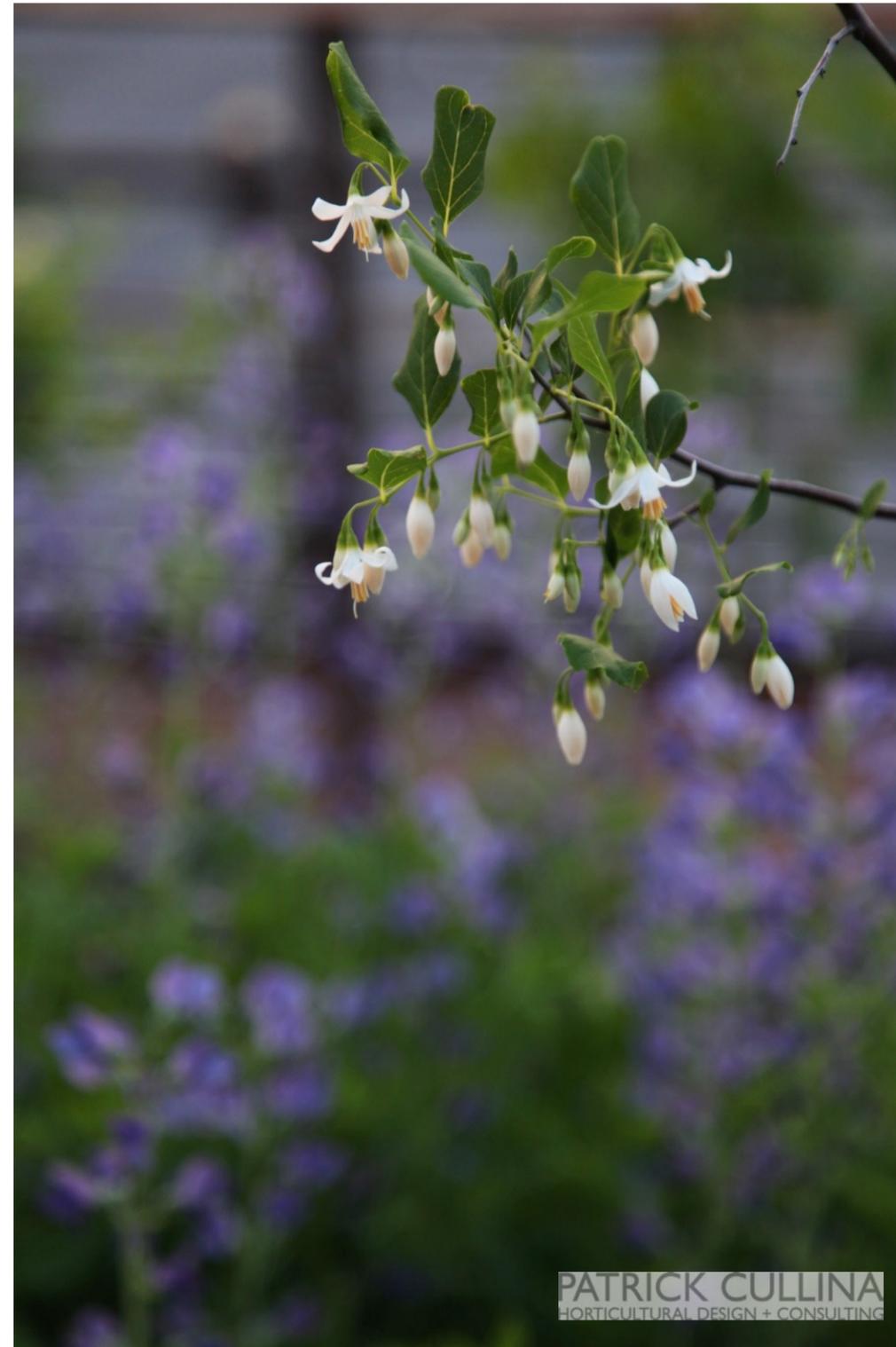
Dynamic Plantings in Constructed Landscapes and/or Restricted Soil Depths





Dynamic Landscape Progression - The High Line



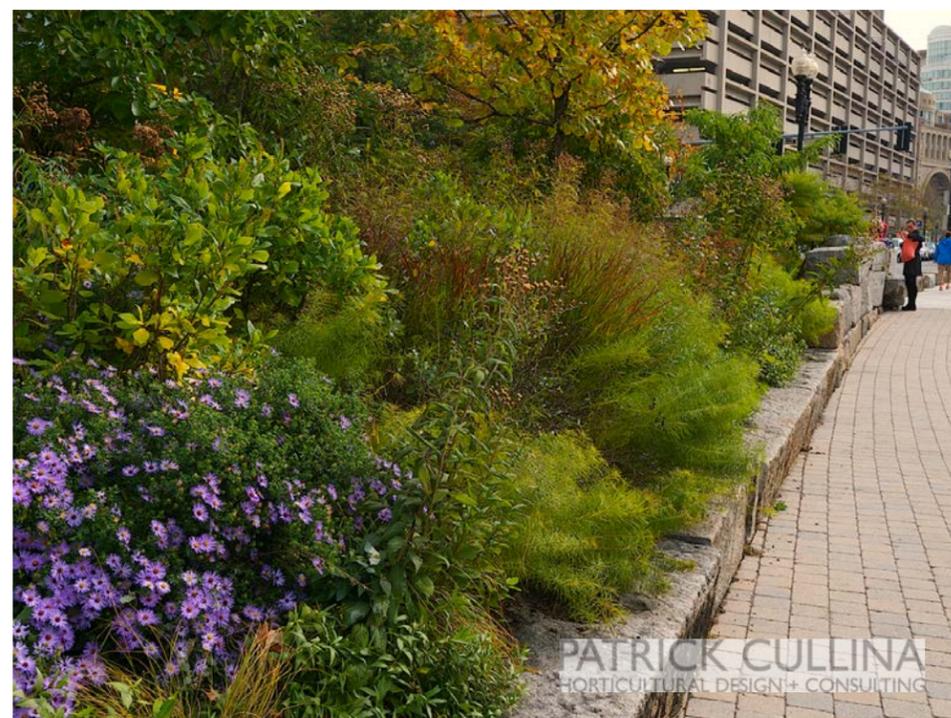
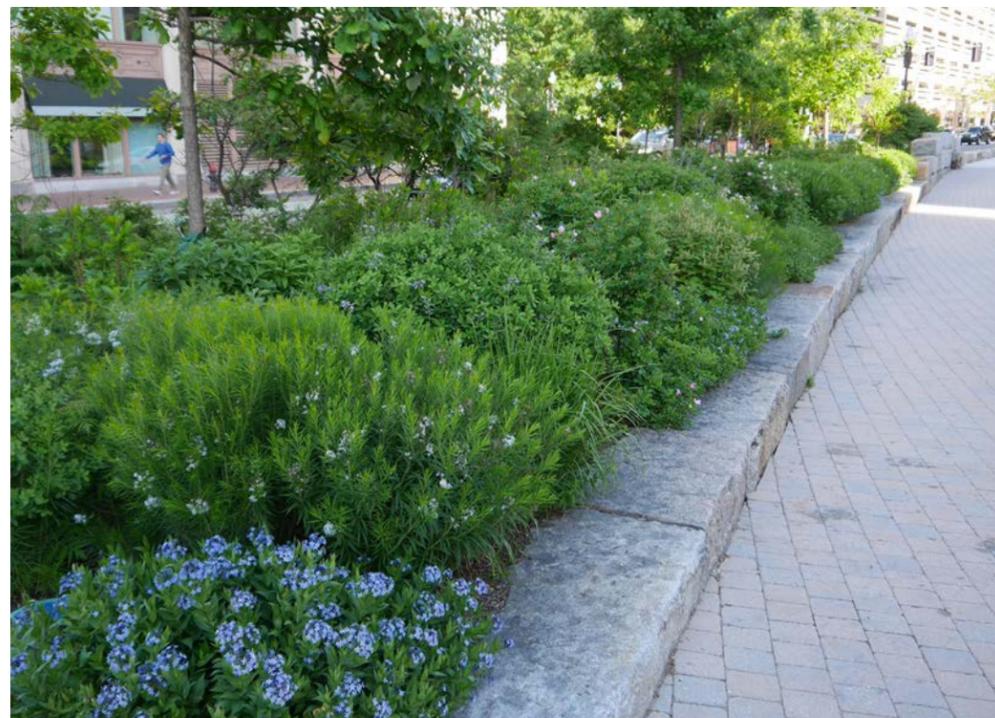


PATRICK CULLINA
HORTICULTURAL DESIGN + CONSULTING

Dynamic Landscapes - Hoover-Mason Trestle/Bethlehem Steel

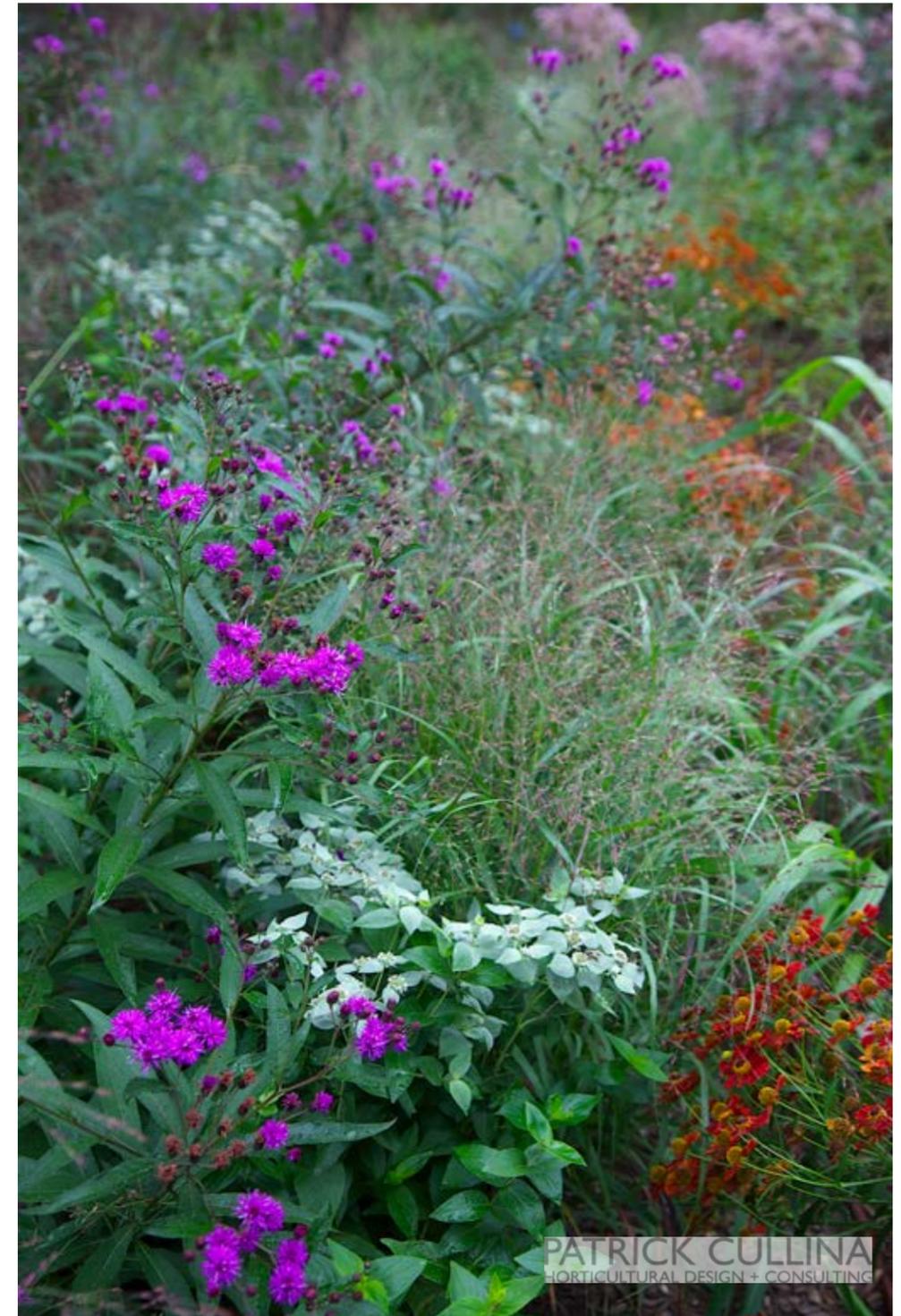


Smithsonian Institution
National Air and Space Museum



Dynamic Landscapes - Rose F. Kennedy Greenway, Boston (Parcel 15)





Dynamic Landscapes - Rose F. Kennedy Greenway, Boston (Parcel 17)



Smithsonian Institution
National Air and Space Museum



Dynamic Landscapes - Rose F. Kennedy Greenway, Boston (Parcel 17/top; 14/bottom)





Dynamic Landscapes - Hot Color Range for Sun/Part Sun





PATRICK CULLINA
HORTICULTURAL DESIGN + CONSULTING

Dynamic Landscapes - Cool Color Range for Sun/Part Sun





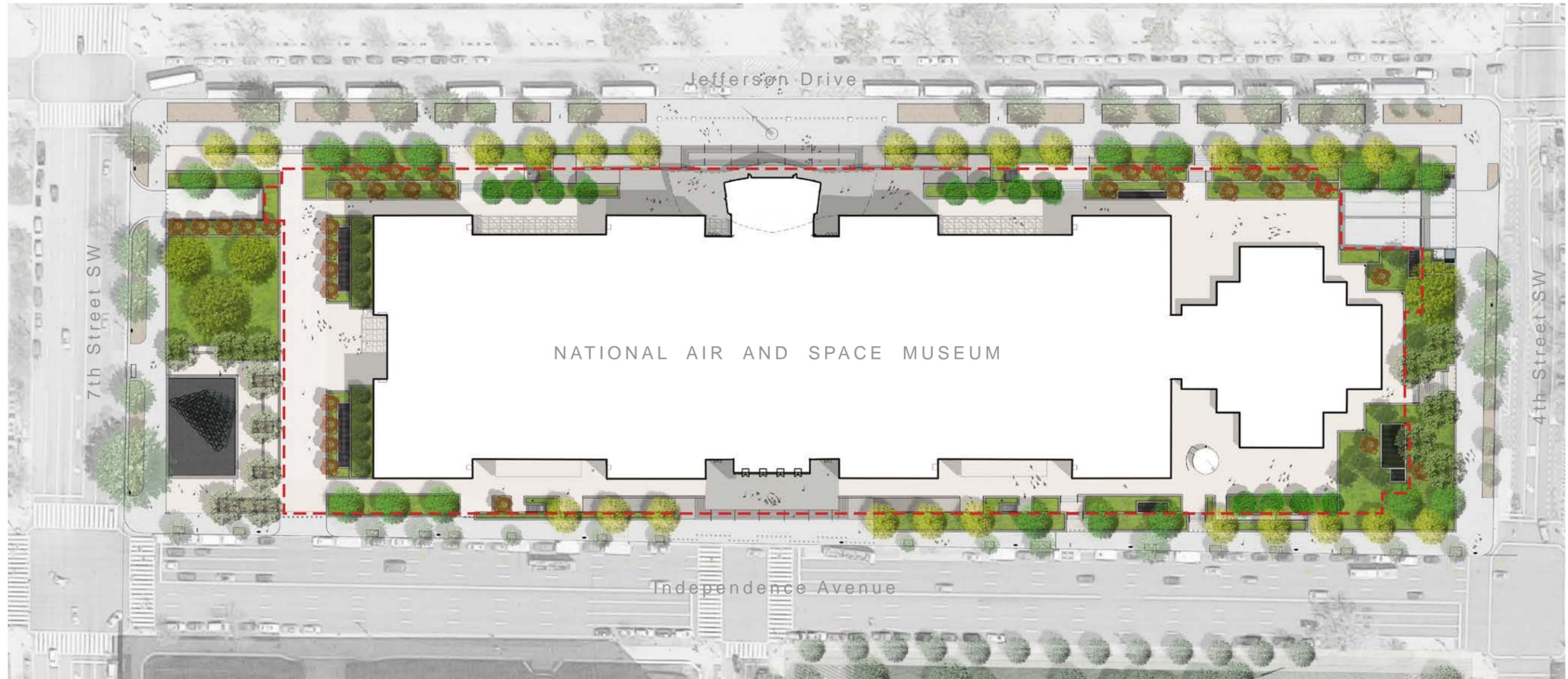
Dynamic Landscapes - Vertical Elements for Shade/Part Shade



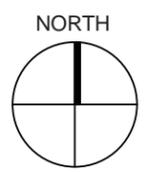


Dynamic Landscapes - Ground Plane Flowering Perennials, Ferns and Sedges for Shade/Part Shade





--- Basement Edge of Structure



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National Air and Space Museum Mall Building Revitalization



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VESTIBULES





1.2.2 SECURITY VESTIBULES

Existing Conditions

The visitor experience at NASM currently begins with an entry experience that lacks sufficient wayfinding, modern security features, protection from the elements, and the kind of welcoming, well organized, and logical flow more fitting to introduce the aviation and space treasures located just inside one of America's most visited museums. With approximately 7 million visitors per year, the existing physical security screening systems are incapable of allowing entrance to the museum at a rate that is fast enough to keep up with demand on a typical weekend in the summer or during holidays. This leads to extensive queues of several hundred people at the north and south entrances, with wait times over 30 minutes in frequently inclement weather conditions.

The security gates resemble airport security checkpoints with magnetometers and x-ray machines. However there are no signs explaining the procedure. This is further exacerbated with the number of foreign visitors, often resulting in a language barrier. Because the security gates are located only 8-10 ft. inside the inner vestibule doors, visitors do not see what they have to do until they are almost at the security gate itself. Parents with strollers have to remove all the bags and other accoutrements from the strollers, place them in the bins, and then re-pack the strollers at the other end of the x-ray machines. Unlike at airports, there are no tables on which people can place their things as they approach the x-ray machines.

Master Plan

The 2013 Master Plan recommended the construction of security vestibules to address the problems of long, inhospitable lines and the fact that the security stations detract from the exhibits within the Milestones of Flight gallery, where many of the museum's most important collections are exhibited -- including the Spirit of St. Louis and the Mercury space capsule. The performance criteria for the vestibules listed below is as prescribed by the Master Plan.

- Security
 - Mall Side: 4 lanes
 - Independence Ave Side: 3 lanes
- Inside Queuing
 - Maximum wait time: 5 minutes inside
 - Mall Side: 2,000sf (185.8m²) Vestibule
480sf (44.5m²) Screening Equipment
 - Independence Ave Side: 1,500sf (139.4m²) Vestibule
360sf (33.5m²) Screening Equipment
- Protected Outdoor Screening

Massing and Materiality of Proposed Vestibules

As informed by SI's recommendation to incorporate the mission of the museum "to commemorate, educate, and inspire" in the vestibule design, the proposal evokes the images of the early flying machines developed by Leonardo DaVinci and the Wright Brothers as exhibited within the building by implementing a tensile roof that has the abstract shape of wings. This continuous roof encloses a curtain wall vestibule and provides protection of adjacent exterior queue areas.

The integration of these forms in plan and elevation responds to the architectural rhythm of the existing building. The shape of the roof expands and contracts to create larger covered areas on the central axis of the building at the north entrance, then reduces in size before enlarging again to protect the queues in front of the flanking stone clad pavilions. This dynamic undulation helps evoke the imagery of flight, similar to the earlier explorations for DaVinci and the Wright Brothers, with the update of contemporary, progressive methods of construction that allow these structures to be built more efficiently in the present day. The organic shape of the roof form also helps the visual integration of the landscape with the building.

The security screening is located within a transitional space of reduced width and lower ceiling height, creating the impression of spatial "compression" before being "released" into the large expanse of the Milestones of Flight gallery, energizing the visitor experience.

Visitor Flow

A method of increasing "through-put" without increasing security staff requirements is the use of "divest and composure" tables located before and after the security equipment respectively in the visitor entry sequence. This provides visitors an opportunity to prepare for the screening process by placing their bags in a bin on a divest conveyor belt, with the collection of their possessions from the composure tables without obstructing visitor flow. When combined with improved signage to inform visitors of the screening requirements in advance of arriving at the security lanes, these methods can accelerate the security screening process. The use of divest and composure tables requires an increase in area beyond the prescribed totals listed in the Master Plan in order to accommodate these functions.

Vestibule Narrative



Comments from the Commission of Fine Arts, Concept Design

For the entrance pavilions, [The Commissioners] **expressed support for their elegant, curvilinear forms, but noted that full review of the design of the structures requires understanding their relationship to the building's new cladding material.**

From the letter, June 23 2016, from Thomas E. Luebke, FAIA, Secretary



North Vestibule Perspective View from National Mall -- June 2016 Concept CFA Report



South Vestibule Perspective View from South -- June 2016 Concept CFA Report



North Vestibule Perspective View From Northeast -- June 2016 Concept CFA Report



South Vestibule Perspective View from Southeast -- June 2016 Concept CFA Report

June 2016 Concept CFA Report and Commissioner Response





Visitors waiting in line to enter the museum at the north entrance



Entrance queue within north vestibule



Security screening inside the north entrance



Visitors waiting in line to enter the museum at the south entrance



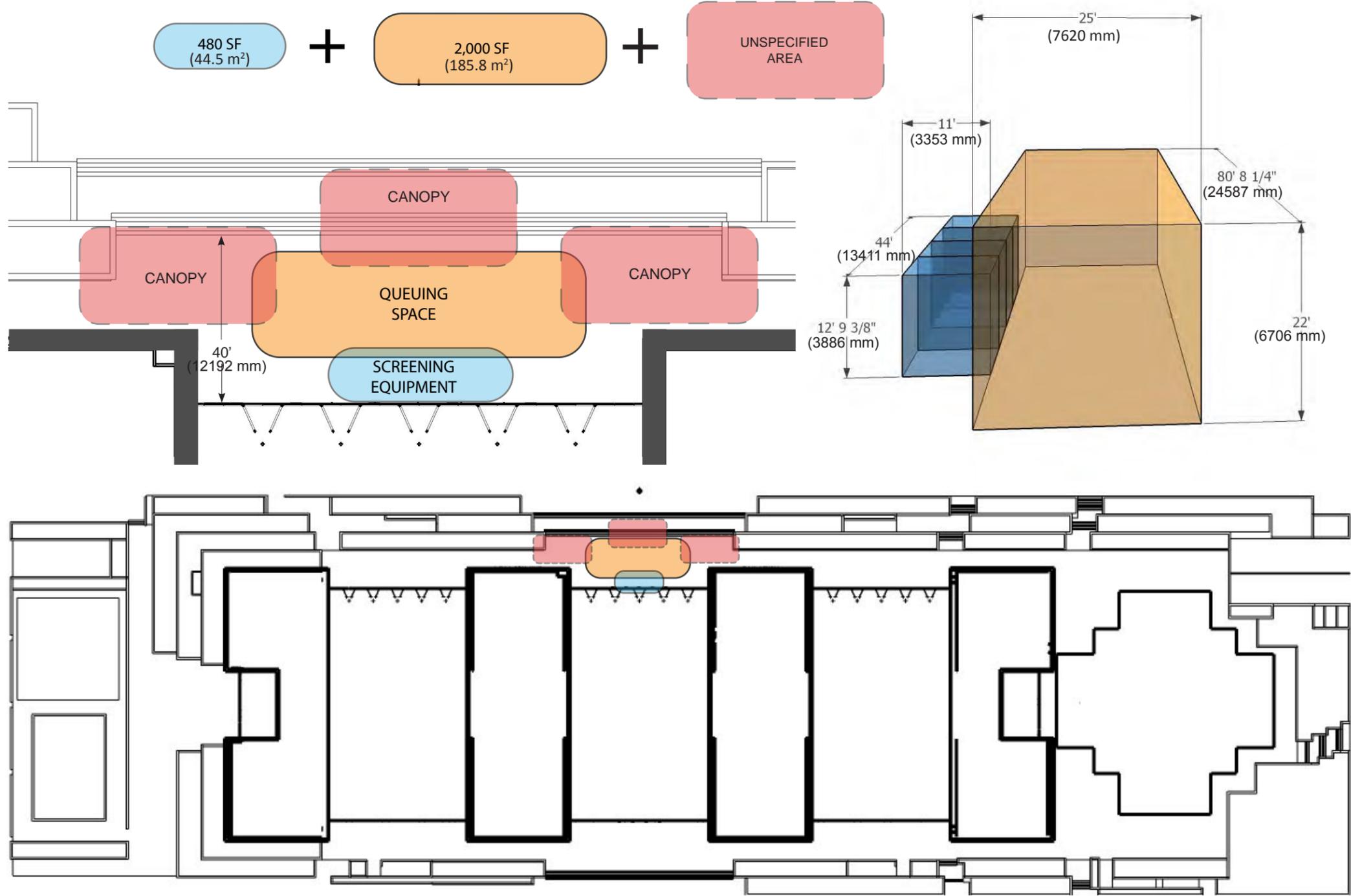
Entrance queue at south entrance



Security screening inside south entrance

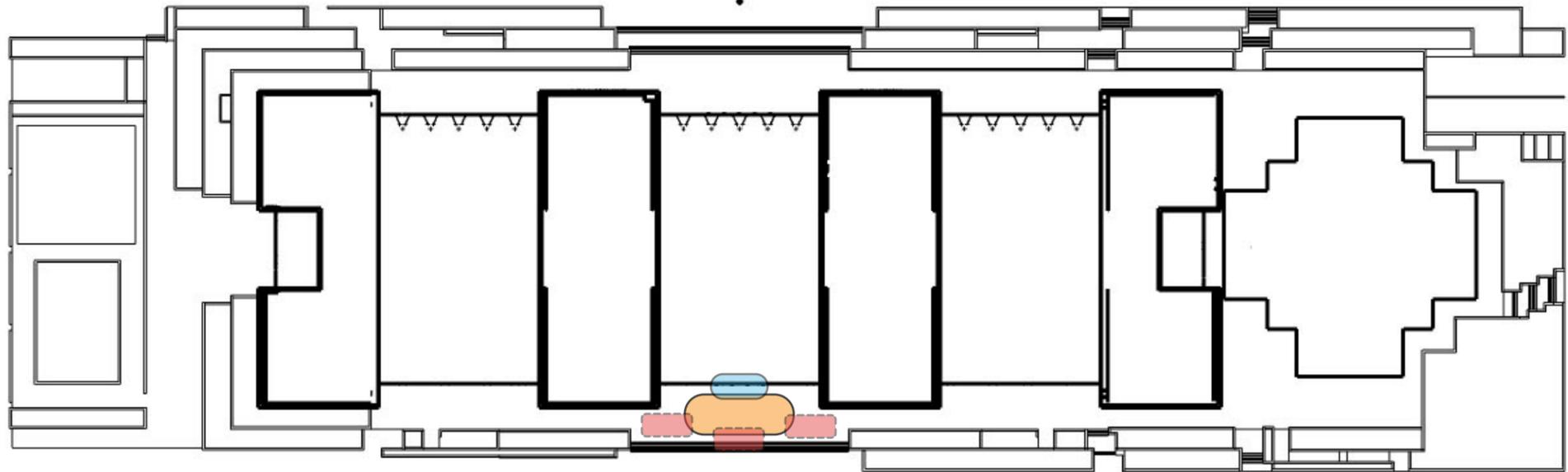
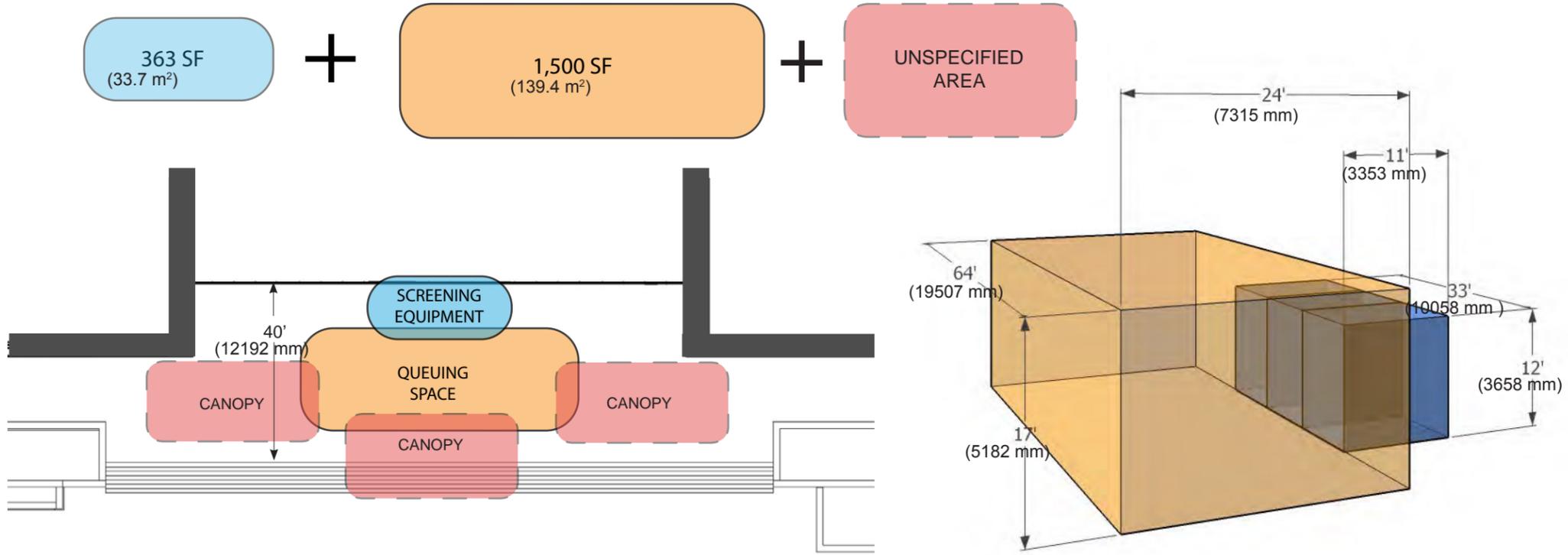
Security / Visitor Experience





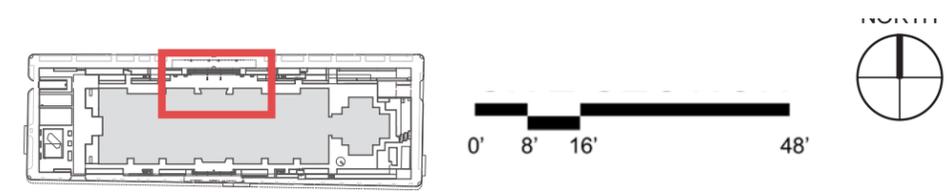
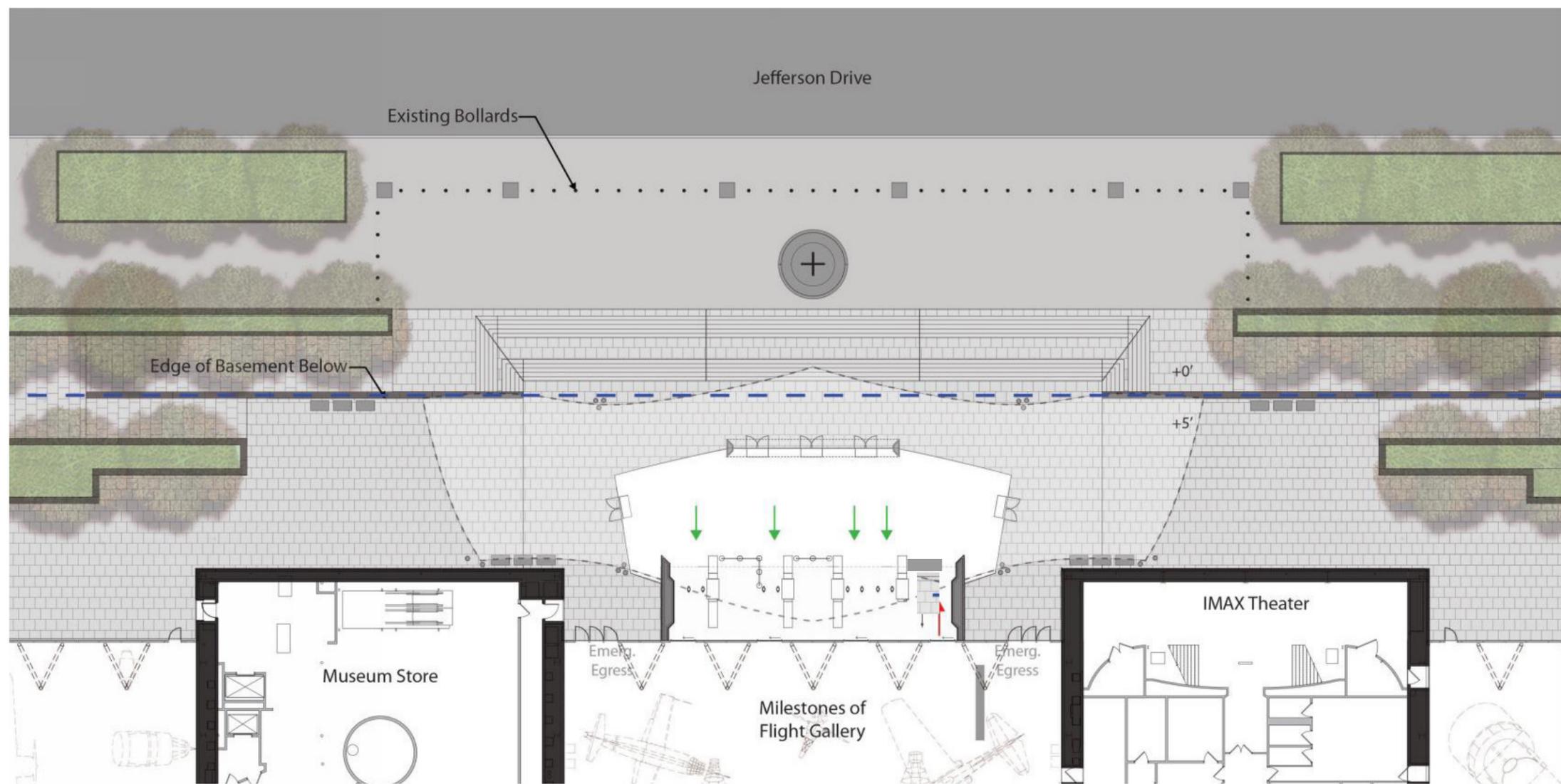
North Entrance Master Plan Requirements





South Entrance Master Plan Requirements





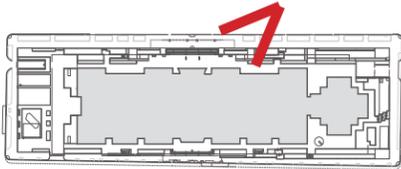
North Vestibule Proposal - Floor Plan





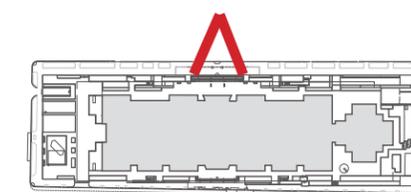
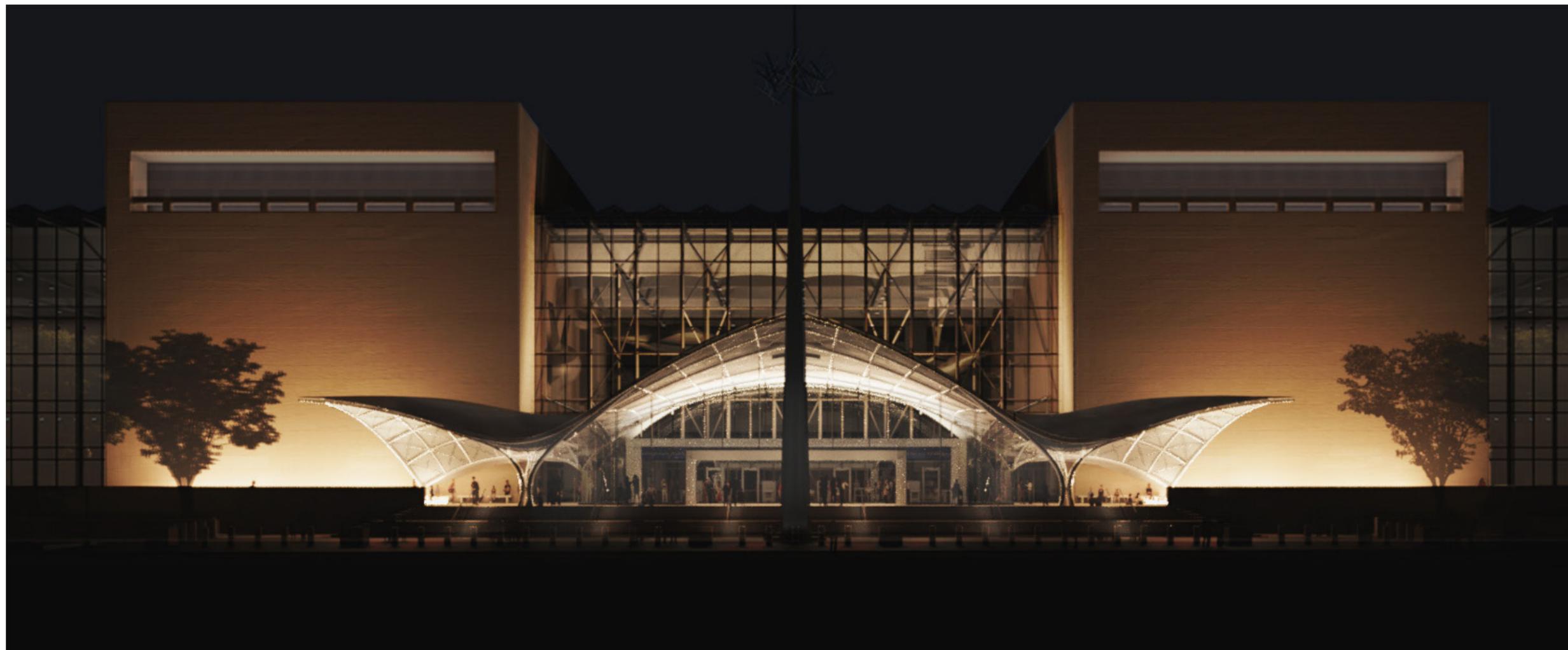
North Vestibule Proposal - Full and Partial North Elevation





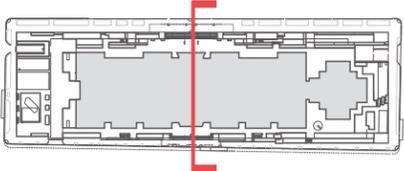
North Vestibule Proposal - Exterior Perspective





North Vestibule Proposal - Gary Steffy Lighting Design Facade Concept

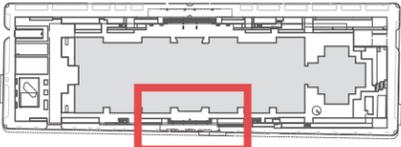
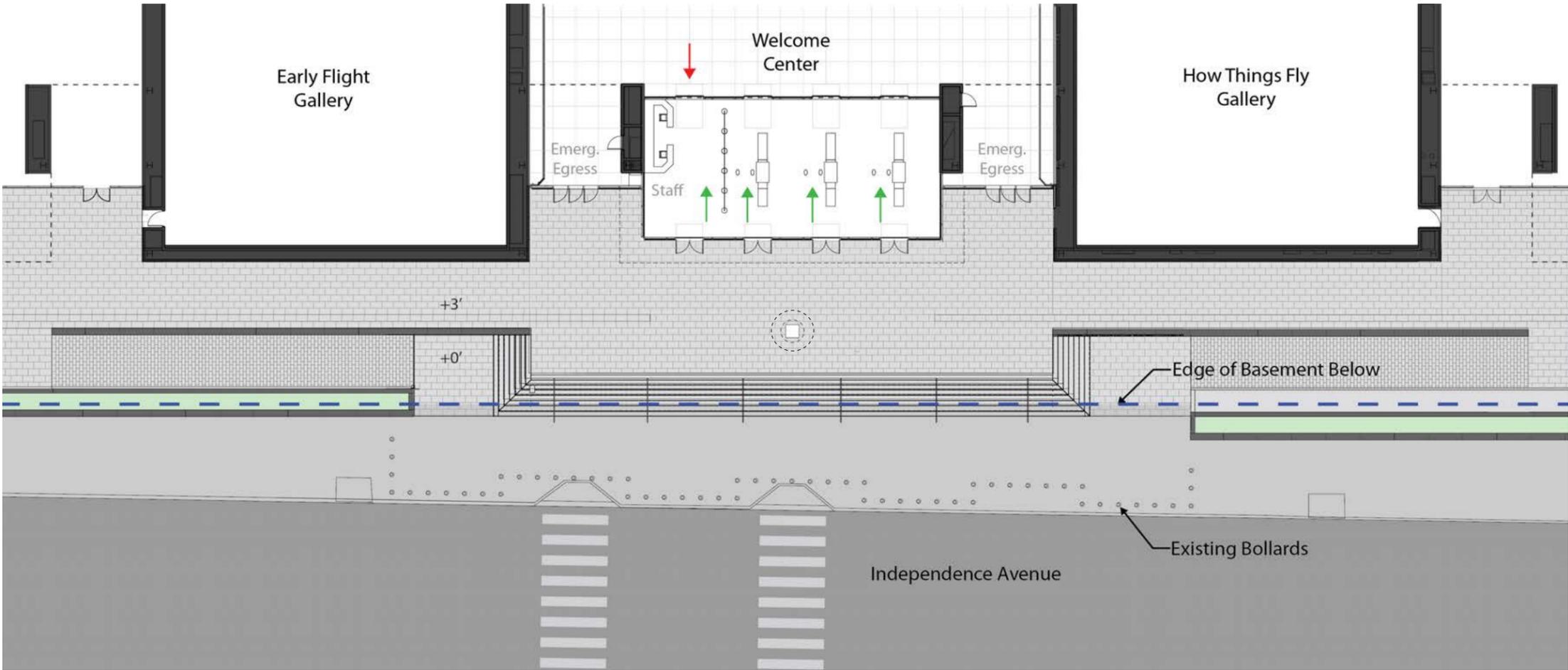




Full Building Section



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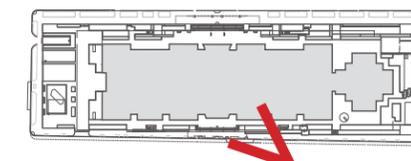
South Vestibule Proposal - Floor Plan





South Vestibule Proposal - Full and Partial South Perspective Elevations





South Vestibule Proposal - Perspective from Southeast





Security Vestibules

June 2015 and June 2016 - CFA Concept Report
North Vestibule Studies 132

June 2015 and June 2016 - CFA Concept Report
South Vestibule Studies 133

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Extracts 134

August 2017 - 100% Construction Documents
South Vestibule Option 135

Photovoltaics

Solar Canopy Roof Plan, Proposed Roof PV
Array Plan, Building Section, Aerial View 136

APPENDIX



JUNE 2015

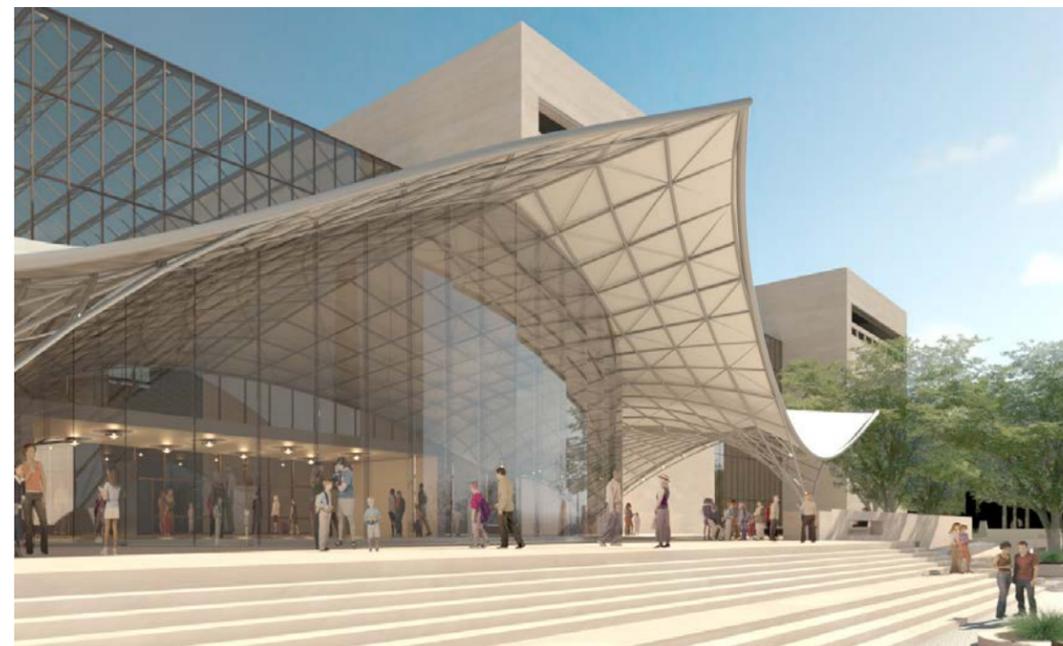


North Elevation

JUNE 2016



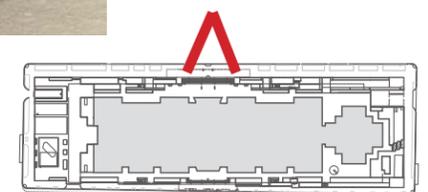
North Elevation



Exterior Perspective from Northeast



Exterior Perspective from Northeast



June 2015 and June 2016 - CFA Report North Vestibule Studies



JUNE 2015



South Elevation

JUNE 2016



South Elevation

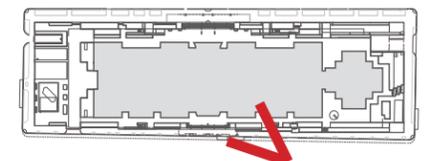


Exterior Perspective from Southeast



Exterior Perspective from Southeast

June 2015 and June 2016 - CFA Report South Vestibule Studies



NORTH VESTIBULE



North Vestibule Perspective View from National Mall -- September 2015 Vestibule Schematic Design Report

SOUTH VESTIBULE



South Vestibule Perspective View from South -- September 2015 Vestibule Schematic Design Report



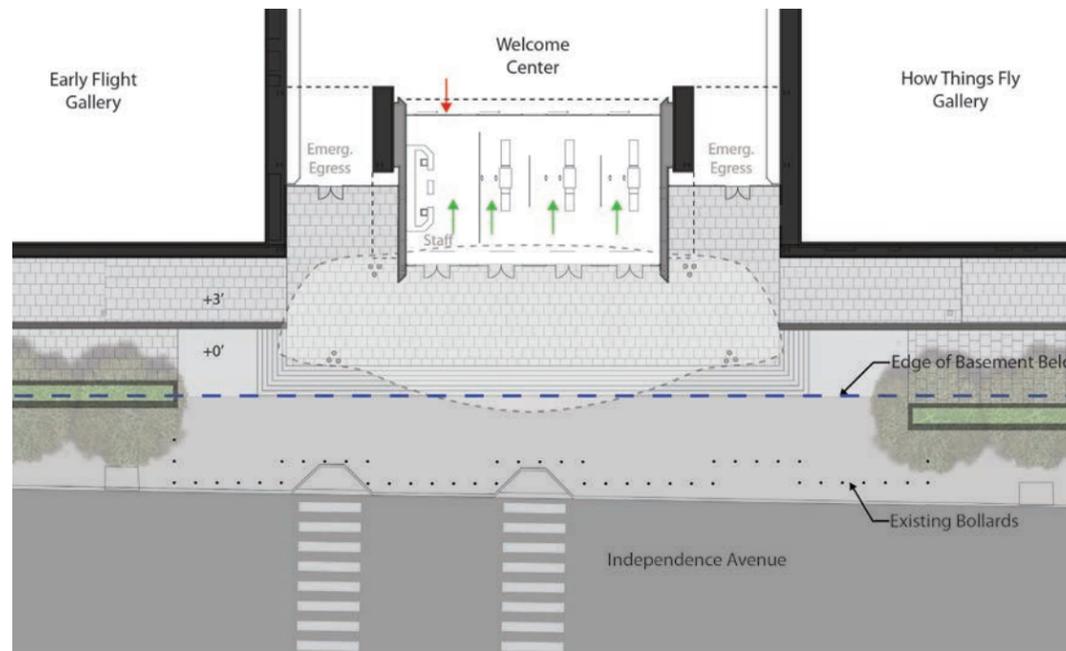
North Vestibule Perspective View From Northeast -- September 2015 Vestibule Schematic Design Report



South Vestibule Perspective View from Southeast -- September 2015 Vestibule Schematic Design Report

September 2015 - Vestibule Schematic Design Report





Floor Plan



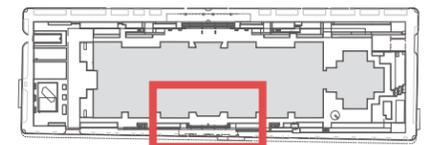
Partial South Perspective Elevation



Section Perspective

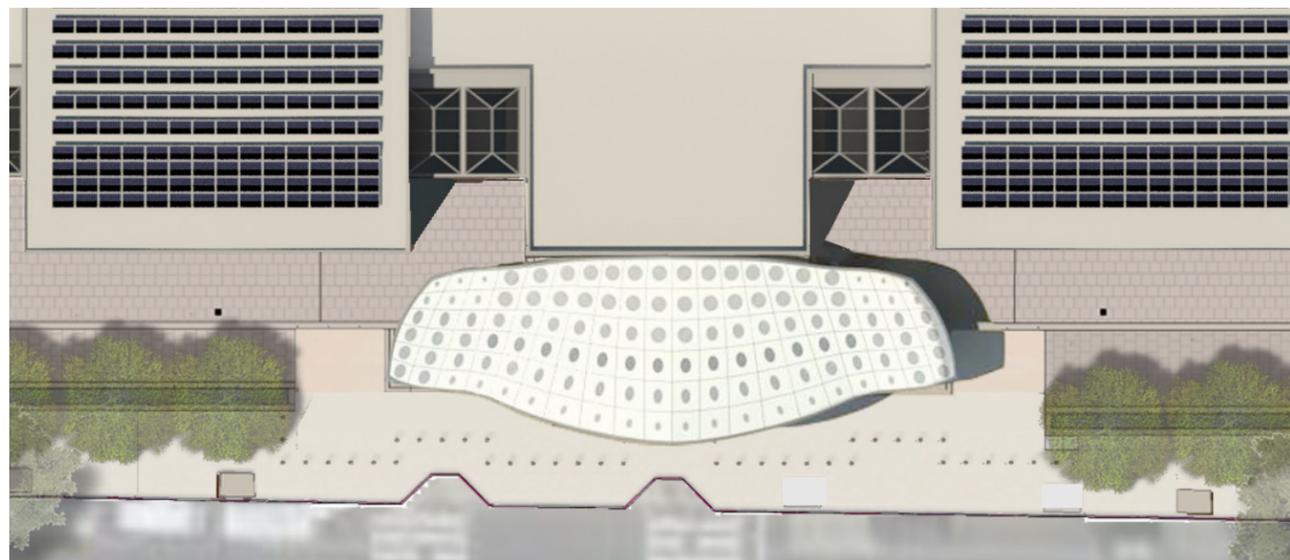


Perspective from Southeast



August 2017 - 100% Construction Documents South Vestibule Option

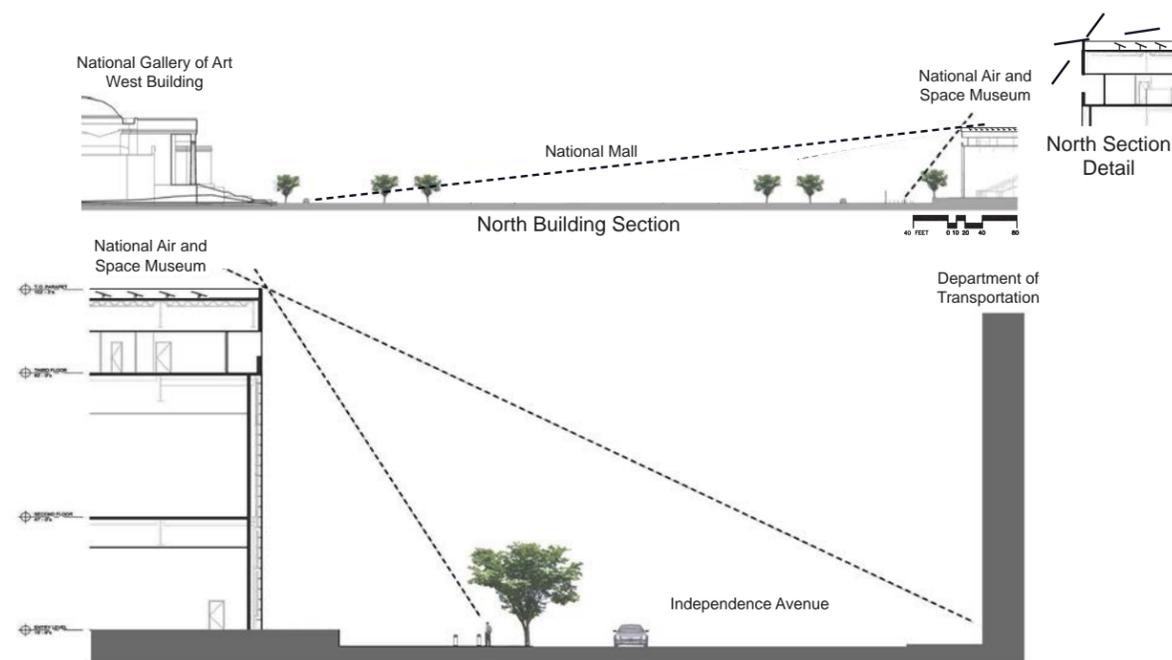




Solar Canopy Roof Plan



Proposed Roof PV Array Plan



Proposed Roof PV Array Building Section



Roof PV Array View from the Washington Monument

Photovoltaics



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