



## Executive Director's Recommendation

Commission Meeting: July 11, 2019

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<b>PROJECT</b> <b>Building Envelope Repairs</b> Hirshhorn Museum and Sculpture Garden 700 Independence Avenue, SW Washington, DC	<b>NCPC FILE NUMBER</b> 7889
	<b>NCPC MAP FILE NUMBER</b> 1.71(38.00)44960
<b>SUBMITTED BY</b> Smithsonian Institution	<b>APPLICANT'S REQUEST</b> Approval of comments on concept plans
<b>REVIEW AUTHORITY</b> Federal Projects in the District per 40 U.S.C. § 8722(b)(1) and (d)	<b>PROPOSED ACTION</b> Approve comments on concept plans
	<b>ACTION ITEM TYPE</b> Consent Calendar

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### PROJECT SUMMARY

The Smithsonian Institution (SI) has submitted concept plans for repairs to the building envelope at the Hirshhorn Museum. The building is now 45 years old and is in need of repairs due to aging, weather, and deficiencies in the original envelope design. In particular, the building's exterior precast panels have issues with their structural attachments. The existing building envelope also lacks a vapor, air and water-resistive barrier, and has no insulation. As a result, there is currently moisture infiltration into the building, including the gallery walls and floors. The lack of insulation also causes poor energy performance.

Therefore, the project scope includes the in-kind replacement of the exterior façade panels with new panels to match the existing material. A three-inch offset will be provided in the building envelope section to allow for waterproofing and insulation. The joint system will match the existing design. In addition, the balcony glazing facing the National Mall will be replaced to closely match the existing condition. New accessible doors will be provided and the glazing system will be blast-resistant. Finally, the roof is also at the end of its life and must be replaced.

### KEY INFORMATION

- The Hirshhorn Museum and Sculpture Garden is SI's museum of modern and contemporary art.
- Designed by Gordon Bunshaft of Skidmore, Owings and Merrill, the Hirshhorn campus is located on Independence Avenue SW, framed by 7th Street to the east, the Mary Livingston Ripley Garden to the west, and across Jefferson Drive, the sculpture garden opens to the National Mall along its northern edge. The museum and sculpture garden are organized

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around the 8th Street north-south axis, aligning with the National Gallery of Art's Sculpture Garden and the National Archives across the National Mall to the north.

- The museum building is a cylindrical volume raised fourteen feet above the ground on sculptural concrete piers. The building contains four above-ground stories clad in precast concrete panels with an exposed aggregate surface. The precast panels encircle the building in bands of alternating heights, with minimal joints. A single opening on the exterior of the drum is located on the third story and features a glazed recess and balcony facing north toward the National Mall. The center of the drum opens to a circular courtyard with a shallow fountain.
- The Hirshhorn Museum and Sculpture Garden have been determined individually eligible for the National Register of Historic Places, while already considered contributing elements to the National Mall listing. The Determination of Eligibility identifies the following features as character-defining: drum-shape building form with central courtyard, sculptural cast-in-place concrete piers, precast concrete panels, coffered ground-level ceiling, third story balcony and glazing, and the entrance lobby with revolving doors.
- The Smithsonian Institution's South Mall Campus Master Plan was approved by the Commission on June 7, 2018. It included recommendations to improve and revitalize both the Hirshhorn Museum and the Sculpture Garden.
- The Commission provided comments on the concept design for the Sculpture Garden revitalization in May of 2019.
- To fulfill the Section 106 requirements for the South Mall Master Plan, both the Smithsonian Institution and NCPC signed a Programmatic Agreement (PA) in 2018.
- Beginning in 2016, SI began a series of tests and evaluations of the building envelope given. Those investigations looked at the exterior precast concrete panels, glazing systems, and the roof. The analysis identified a number of challenges that are to be addressed as part of the repair project.

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## RECOMMENDATION

The Commission:

**Notes** the Hirshhorn Museum building is 45 years old, and due to the effects of aging, weather, and design deficiencies in the original building envelope, is in need of repair.

**Supports** the Smithsonian Institution's efforts to address structural deterioration, prevent water infiltration and condensation, improve the building envelope performance, and protect the museum collections.

**Notes** the Smithsonian Institution has proposed the in-kind replacement of the precast concrete panels on the exterior façade, with an additional three-inch space to accommodate waterproofing, insulation, and structural attachment.

**Finds** the proposed dimensional change in the building section will generally not alter the perception of the building, particularly if the panel joint pattern is retained, and the precast concrete aggregate matches the original design.

**Notes** the Smithsonian Institution will continue to work the DC State Historic Preservation Officer, the Advisory Council on Historic Preservation, and other consulting parties as part of the Section 106 process to further reduce any potential changes to the character-defining features of the building.

## PROJECT REVIEW TIMELINE

<b>Previous actions</b>	<b>June 7, 2018</b> – Approval of South Mall Campus Master Plan.
<b>Remaining actions</b> (anticipated)	– Approval of preliminary and final building plans

## PROJECT ANALYSIS

### Executive Summary

The Hirshhorn Museum building is 45 years old, and due to the effects of aging, weather, and design deficiencies in the original building envelope, the Smithsonian Institution has identified a number of areas that will need to be repaired. The applicant has conducted a multi-year study to better understand these challenges and to make recommendations that will be problem-solving, while considering the historic eligibility of the building. As such, staff recommends the **Commission support the Smithsonian Institution's efforts to address structural deterioration, prevent water infiltration and condensation, improve the building envelope performance, and protect the museum collections.**

### Analysis

At 45 years old, the Hirshhorn Museum building faces a number of challenges, and is in need of repairs due to aging, weather, and deficiencies in the original envelope design. In particular, the building's exterior precast panels have issues with their structural attachments. The existing building envelope also lacks a vapor, air and water-resistive barrier, and no insulation exists. As a result, there is currently moisture infiltration into the building, including the gallery walls and floors. Lack of insulation also causes poor energy performance, and the roof is nearing the end of

its life. The Smithsonian Institution has undertaken a comprehensive evaluation of the approach necessary to address these challenges. In doing so, they have also identified certain project goals. These include:

- Improve building envelope performance to reduce energy consumption and protect museum collections with a stable environment.
- Prevent water infiltration and condensation on the interior of the building.
- Closely match the character and appearance of the existing precast concrete panels.
- Closely replicate the existing profiles of balcony glazing.
- Improve safety with upgraded precast and glazing attachments to meet blast requirements.
- Improve balcony doors to meet accessibility requirements.

The design concept includes three major components. First, the existing outer façade panels will be removed and replaced in-kind with a material matching the original design. The new façade will be offset three inches to allow for waterproofing and insulation. The panel design and joints will match the existing conditions. Second, the balcony glazing system will be replaced to closely match the existing conditions. The new glazing system will be blast-resistant, and doors will be modified to meet current accessibility standards. Finally, the roof assembly will be replaced. The drainage system will be improved as part of the project. No changes will be visible from the ground level and the profile of the building will not change. Staff's analysis focuses on these three components in the sections that follow.

### *Building Background*

Designed by Gordon Bunshaft of Skidmore, Owings and Merrill, the Hirshhorn campus is located on Independence Avenue SW, framed by 7th Street to the east, the Mary Livingston Ripley Garden to the west, and across Jefferson Drive, the sculpture garden opens to the National Mall along its northern edge. The museum and sculpture garden are organized around the 8th Street north-south axis, aligning with the National Gallery of Art's Sculpture Garden and the National Archives across the National Mall to the north. The museum was opened to the public in 1974.

The museum building is a cylindrical volume raised fourteen feet above the ground on sculptural concrete piers. The building contains four above-ground stories clad in precast concrete panels with an exposed aggregate surface. The precast panels encircle the building in bands of alternating heights, with minimal joints. A single opening on the exterior of the drum is located on the third story and features a glazed recess and balcony facing north toward the National Mall. The center of the drum opens to a circular courtyard with a shallow fountain.

The Hirshhorn Museum and Sculpture Garden have been determined individually eligible for the National Register of Historic Places, while already considered contributing elements to the National Mall listing. The Determination of Eligibility identifies the following features as character-defining: drum-shape building form with central courtyard, sculptural cast-in-place concrete piers, precast concrete panels, coffered ground-level ceiling, third story balcony and glazing, and the entrance lobby with revolving doors.

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*Current Conditions and Findings*

Beginning in 2016, SI began a series of tests and evaluations of the building envelope. Those investigations looked at the exterior precast concrete panels, glazing systems, and the roof. Other tests were performed on the sculpture garden wall and the museum plaza walls. The investigations identified a number of challenges that are to be addressed as part of the repair project. Regarding the precast panels, the design team found compromised structural attachments at many locations. This included cracking and spalling on a number of the concrete panels. The investigation also found small bearing areas on some of the relieving angles, and a defect in a wedge insert, likely due to a manufacturing defect. Since 2018, SI has been monitoring the façade to address any potential life-safety issues.

As noted previously, the exterior façade assembly lacks a vapor, air, and water-resistive barrier and insulation. As a result, water infiltration occurs around balcony joints and condensation occurs on the interior side of the concrete structural wall. Significant condensation has been noted by the design team, with approximately 15-20% of the second level insulation wet. Water infiltration is causing deterioration of gallery plaster walls and seepage is occurring through the structural slab at the 2<sup>nd</sup> floor. Water stains and organic growth have also been found in the second level. Finally, because the façade lacks insulation, SI has indicated that the Hirshhorn building is the most inefficient SI museum building in terms of energy consumption. Improving energy performance is therefore one of the goals of the project.

*Exterior Façade Replacement*

Given these findings, the applicant is proposing several repairs to the building envelope. The first, and most significant, includes removing the existing precast panels and replacing them in-kind. An additional three-inch façade offset will also be provided, in addition to the existing one-inch gap. This will accommodate two-inch thick insulation, a one-inch air gap, and a one-inch space for the anchor attachments. The new insulation will help improve energy performance, while the additional gap and an applied water barrier will help prevent infiltration and condensation on the interior of the building. Due to the additional spacing, the entire drum of the building will essentially grow three inches outward on all sides. Based upon the submitted renderings, staff does not find that this dimensional change is particularly significant or perceptible. The applicant proposes to retain the same joint pattern and to match the concrete aggregate in the precast panels. Therefore, staff recommends the **Commission finds the proposed dimensional change in the building section will generally not alter the perception of the building, particularly if the panel joint pattern is retained, and the precast concrete aggregate matches the original design.**

As noted previously, the precast concrete panels that form the façade of the building are character defining features of the museum. Because of the dimensional changes in the building section, as well as some existing deterioration, the existing panels cannot be reused. Replacement of the panels in-kind will require matching the original concrete and aggregate. SI has identified the original aggregate as Swenson Pink Granite. This granite is not available as an aggregate, but

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Kannapolis Granite, located in the same area, matches and is available in aggregate form. Alternately, SI has identified Stony Creek granite as an alternative.

SI has already begun a limited cleaning of the existing façade to compare and confirm the material color and appearance. According to the applicant, the proposed aggregates appear to closely match the original precast material. Additional analysis, as well as studies, will be prepared and shared as the project advances. Staff notes that SI will continue to work the DC State Historic Preservation Officer, the Advisory Council on Historic Preservation, and other consulting parties as part of the Section 106 process to further reduce any potential changes to the character-defining features of the building.

The applicant did evaluate whether it would be possible to reuse the existing precast panels in lieu of replacing them. Further analysis identified several challenges with this approach. In particular, reusing the panels would not allow the additional space necessary for insulator or waterproofing. Further, some panels are already chipped or spalling, and it would be difficult or impossible to reuse them. Given these challenges, SI decided to not pursue this option.

#### *Balcony Glazing Replacement*

A single opening on the exterior of the drum is located on the third story and features a glazed recess and balcony facing north toward the National Mall. As part of the repair project, the glazing will be replaced with a new blast-resistant system. The general configuration and appearance of the glazing system will not be altered. However, minor adjustment will be made at the balcony doors, which will be replaced with a new design that meets accessibility requirements. This includes changes at the bottom of the doors on the push side for use by mobility aids. The balcony concrete pavers, which were installed as part of a temporary repair in 2017, will also be replaced. Overall, however, there will not be a significant visual change as part of the balcony project.

#### *Roof Replacement*

The current roof has a low slope with four area drains that collect runoff. The assembly is a built-up roof on insulation and coverboard. Parapet walls surround the roof on both the exterior façade and courtyard side so that the area is not visible from the ground. The current assembly does not meet minimum slope requirements for drainage, and it suffers from defects in the perimeter flashing. As a result, the entire roof will be replaced. The drainage profile will be adjusted to achieve slope requirements, where possible, and a hot applied rubberized asphalt will be used. Pavers will form the top surface, but the assembly could be retrofitted in the future to accommodate a green roof. From the ground level, there will be no visible changes to the roofline.

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## **CONFORMANCE TO EXISTING PLANS, POLICIES AND RELATED GUIDANCE**

### **Comprehensive Plan for the National Capital**

Staff has reviewed policies from the Urban Design, Historic Preservation, and Visitors & Commemoration Elements, and the analysis and recommendations are intended to support consistency with the Comprehensive Plan.

### **National Historic Preservation Act**

Both the Smithsonian Institution and NCPC have independent responsibilities to comply with Section 106 of the National Historic Preservation Act (NHPA). To fulfill the Section 106 requirements for the South Mall Master Plan, both the Smithsonian Institution and NCPC, a Programmatic Agreement was signed in 2018. The Smithsonian Institution has initiated the Section 106 process for this project, with Public Meeting #1 held on 4/10/19, and creation of a project web site. The Smithsonian has also engaged with the NCPC, CFA, DC SHPO, NPS, and the Advisory Council on Historic Preservation as required by the South Mall Master Plan Programmatic Agreement. Further consultation will continue to further avoid, minimize or mitigate any potential adverse effects from the proposed project.

### **National Environmental Policy Act**

NCPC is the lead agency for compliance with the National Environmental Policy Act (NEPA). The revitalization of the Hirshhorn Museum Building was among the projects identified in the Environmental Impact Statement (EIS) prepared as part of the South Mall Master Plan. At concept review, no NEPA is required.

## **CONSULTATION**

### **Coordinating Committee**

At its June 19, 2019 meeting, the Coordinating Committee forwarded the proposed comments on concept design to the Commission with the statement that the proposal has been coordinated with all participating agencies. Participating agencies include the National Park Service, General Services Administration, Washington Metropolitan Area Transit Authority, the District of Columbia State Historic Preservation Officer, and the District Department of Energy and the

Environment. The DC SHPO noted their coordinating was subject to the completion of the Section 106 consultation process.

### **U.S. Commission of Fine Arts**

At its June 20, 2019, the US. Commission of Fine Arts commented favorably on the concept design for the Hirshhorn Museum building repairs. See attached letter.

### **ONLINE REFERENCE**

The following supporting documents for this project are available online at [www.ncpc.gov](http://www.ncpc.gov):

- Submission Package

Prepared by Matthew Flis  
06/24/2019

### **POWERPOINT (ATTACHED)**

# Hirshhorn Museum and Sculpture Garden Building Envelope Repairs

700 Independence Avenue, SW, Washington DC

Approval of Comments on Concept Plans

Smithsonian Institution

# Site Location



Location Map

# Existing Building Facade



East facade precast panels



South facade precast panels



East facade precast panels



Facade soffit panels



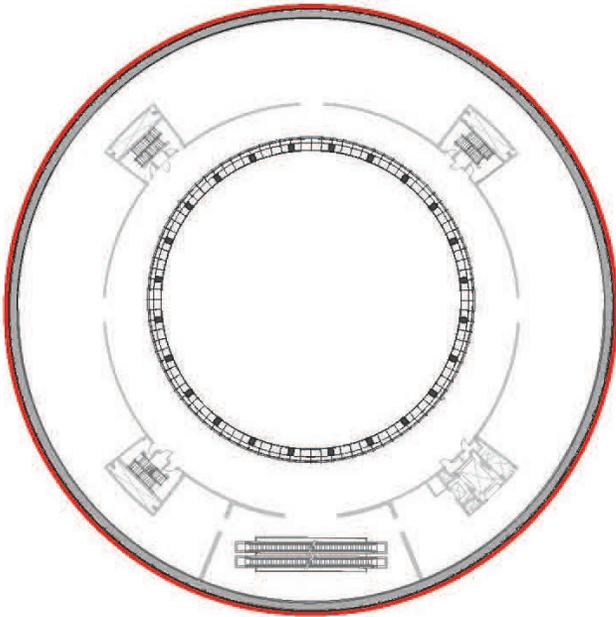
North facade precast panels



View from the Sculpture Garden

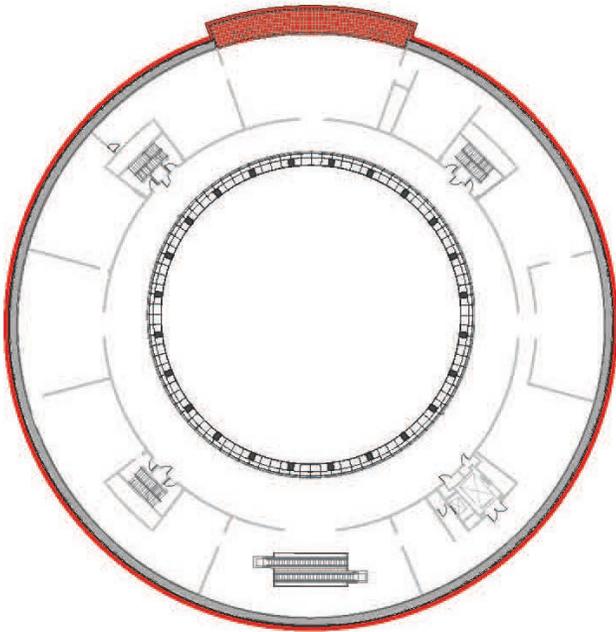
# Building Plans

SCOPE OF PROPOSED REPAIRS



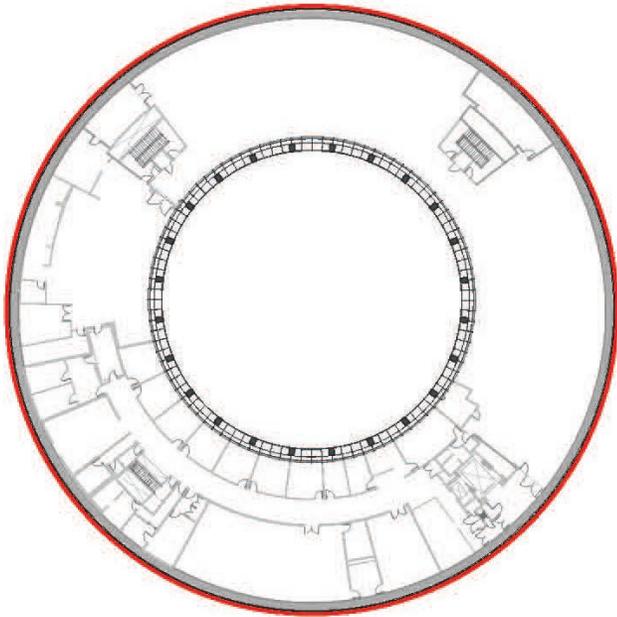
**2ND LEVEL FLOOR PLAN**

Gallery Spaces



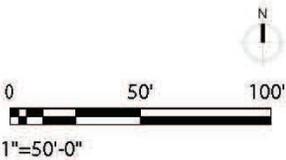
**3RD LEVEL FLOOR PLAN**

Gallery Spaces



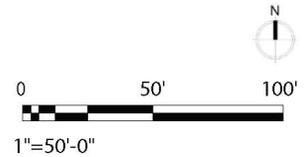
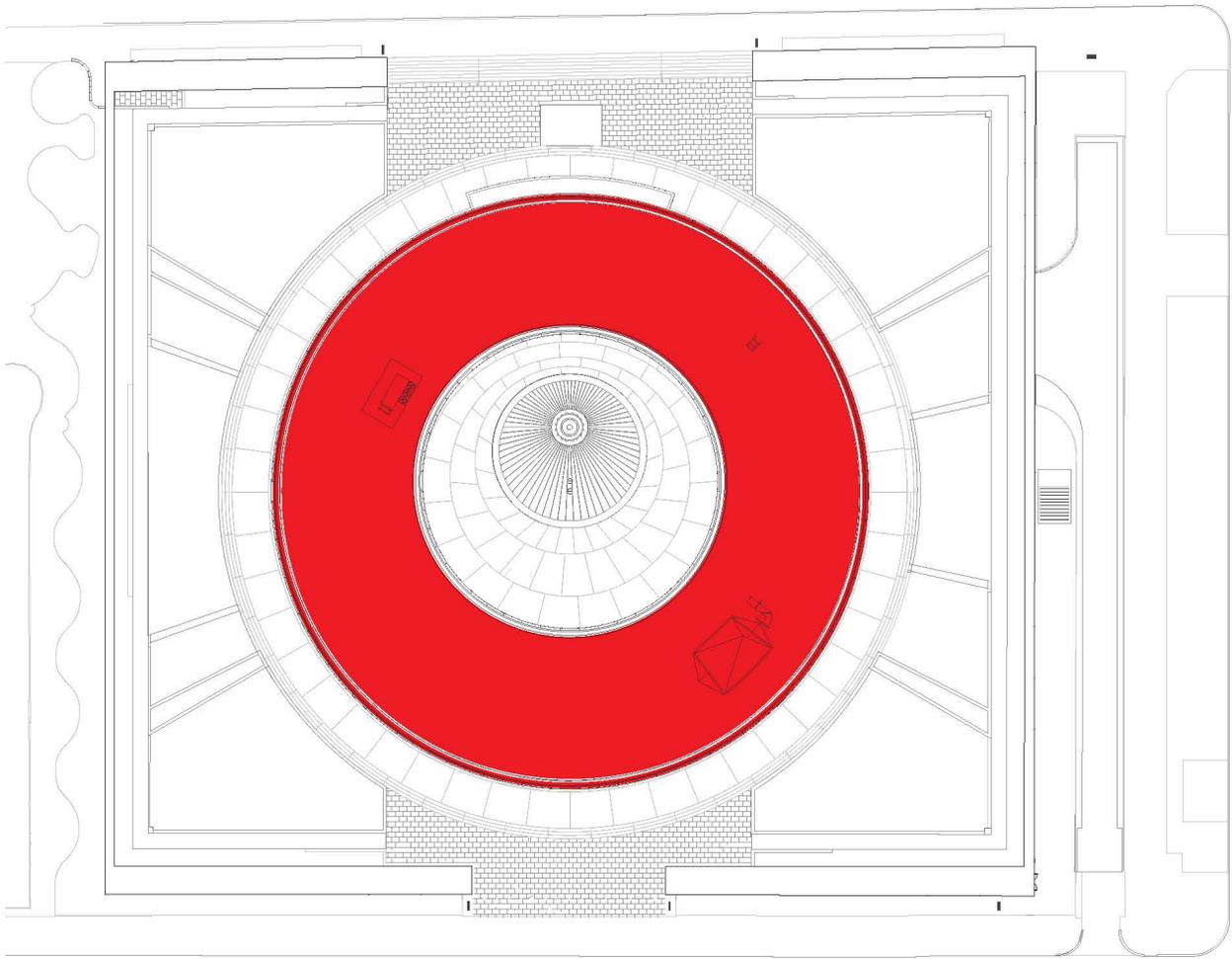
**4TH LEVEL FLOOR PLAN**

Administrative Offices  
Conservation Lab  
Collections



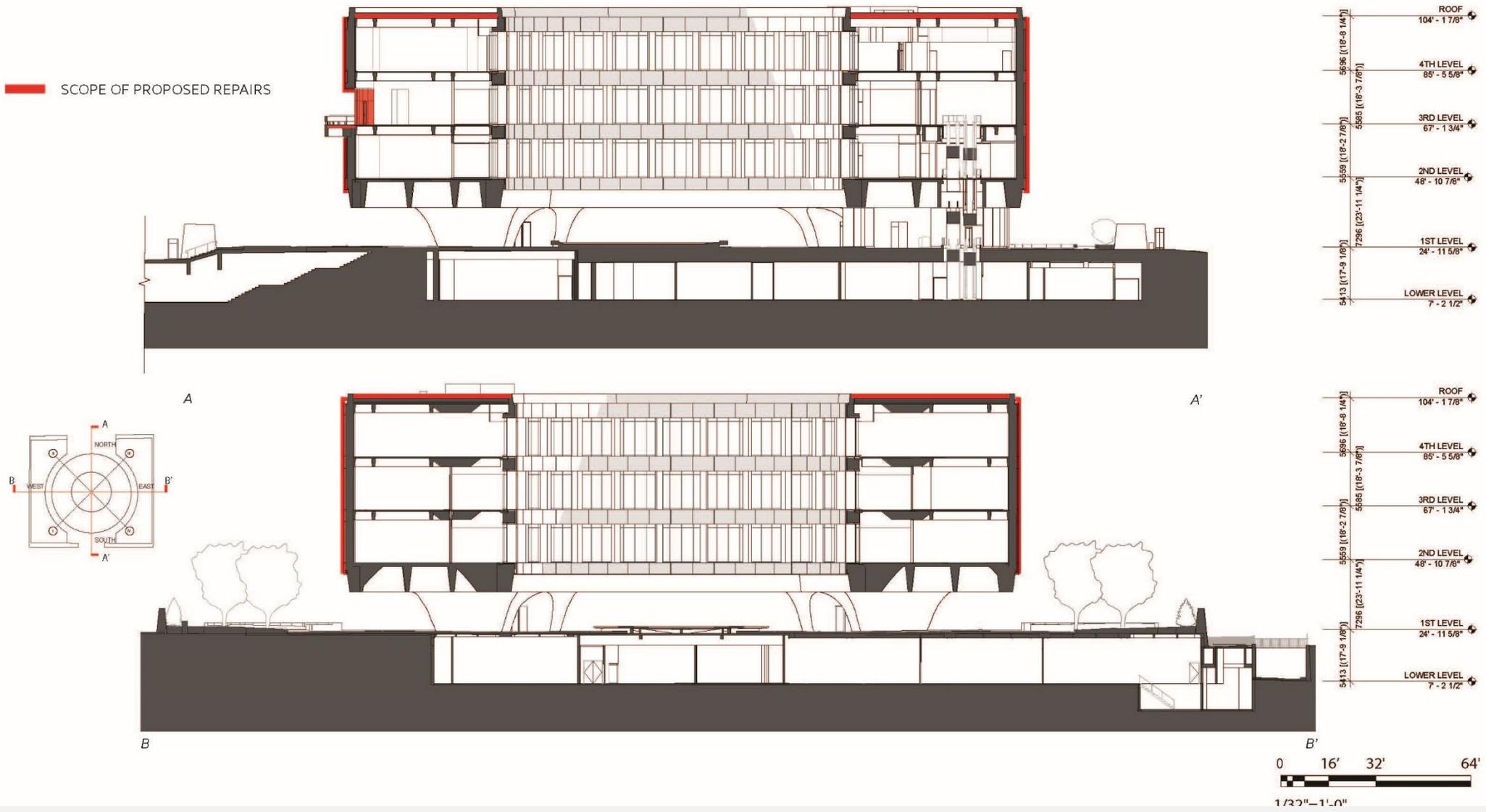
# Roof Plan

 SCOPE OF PROPOSED REPAIRS



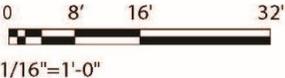
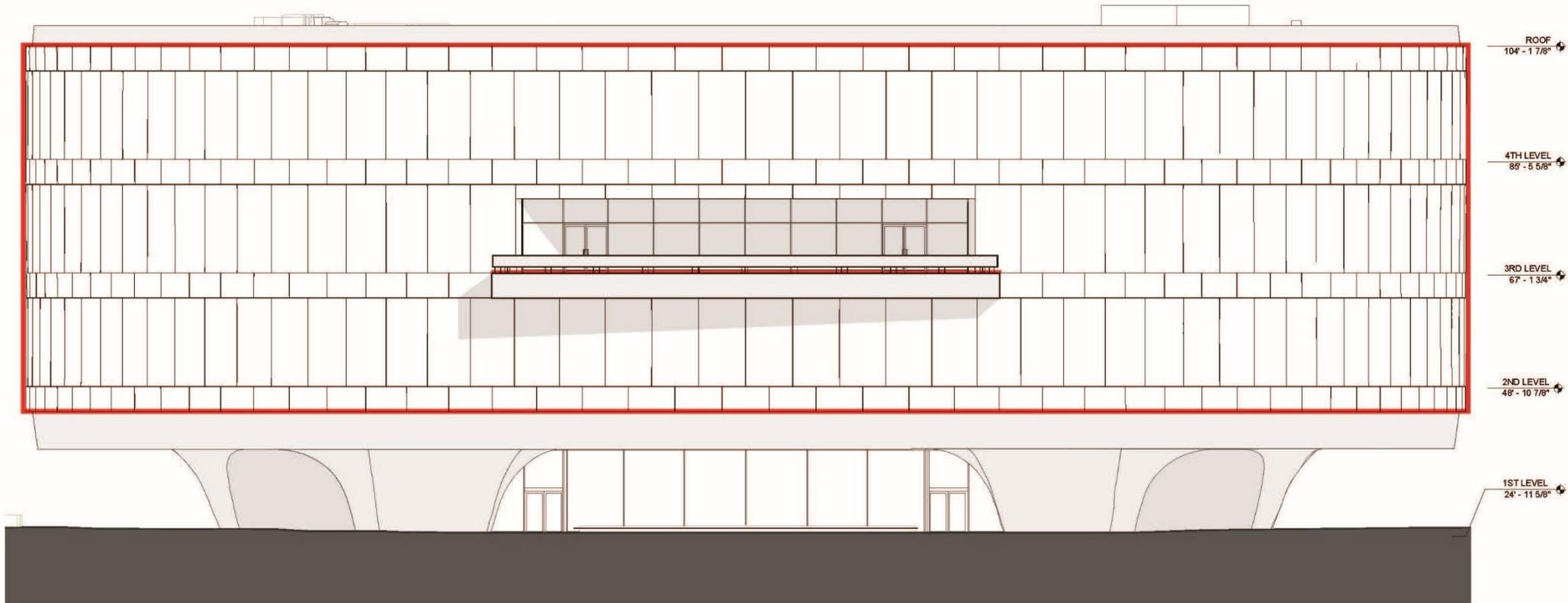
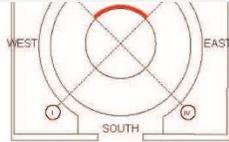
# Building Sections

SCOPE OF PROPOSED REPAIRS



# North Elevation

SCOPE OF PROPOSED REPAIRS

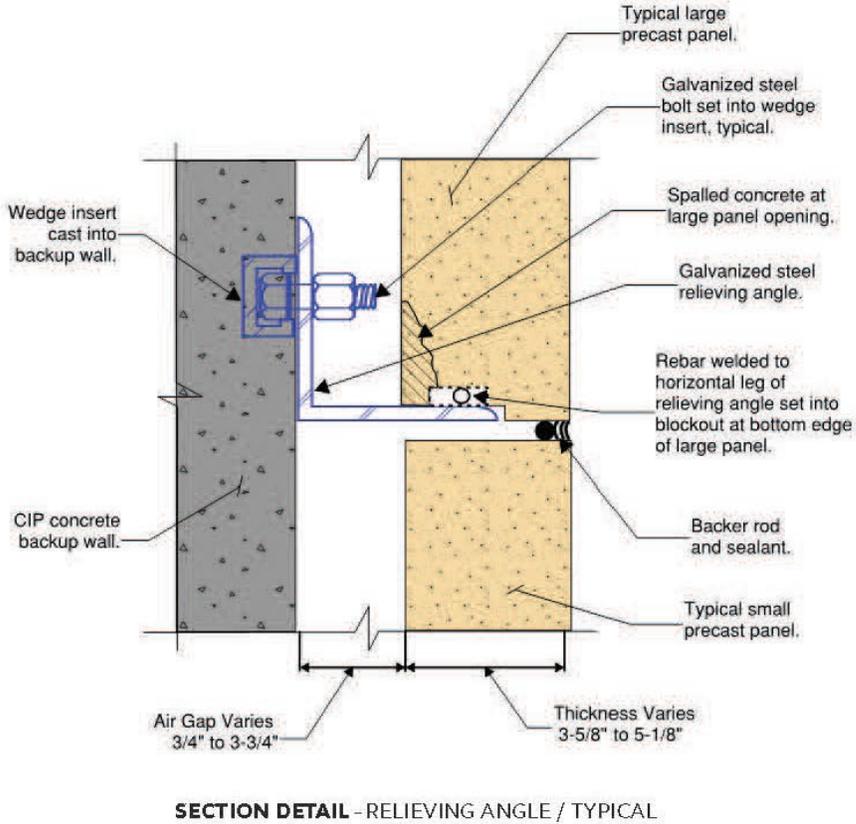


# Existing Panel Issues

**CRACKED CONCRETE  
AT THE RELIEVING ANGLE**



**SPALLED CONCRETE  
AT THE RELIEVING ANGLE**



# Existing Panel Issues



Overall photo of exterior precast concrete panel cladding on outer ring: Note the interchanging rows of large and small panels and staggered vertical joints between rows.



Irregular bearing surface on bottom side of panel not fully in contact with relieving angle



Backside of the concrete panel is cracked adjacent to the bearing surface on the relieving angle



Hard plastic shims (ovals) between small panel (above) and large panel (below)



Large panel bearing on small panel below and uneven spacing between panels



Flame cut slotted hole in strap plate connection to backup wall

# Condensation and Water Infiltration

Evidence of moisture inside enclosure assemblies from condensation and water infiltration



Pink discoloration of water finding test paper indicates moisture in the glass foam insulation of the Second Level Slab Assembly.



Delamination and flaking plaster at the base of the wall finishes at the second level gallery due to the moisture inside the wall assembly.



Water finding test paper indicates the presence of moisture on the interior face of the backup wall behind an electrical outlet.

# Condensation and Water Infiltration

Evidence of moisture inside enclosure assemblies from condensation and water infiltration



The interior plaster finishes are applied to expanded metal lath that is supported by steel framing (arrows). The framing and lath have surface corrosion and the backup wall is covered with a black coating that is stained.



The backup wall is covered with water stains and organic growth emanating from the top of the second level wall. The bottom edge of the steel angle support is visible (arrow).

# Existing and Proposed Panel Section

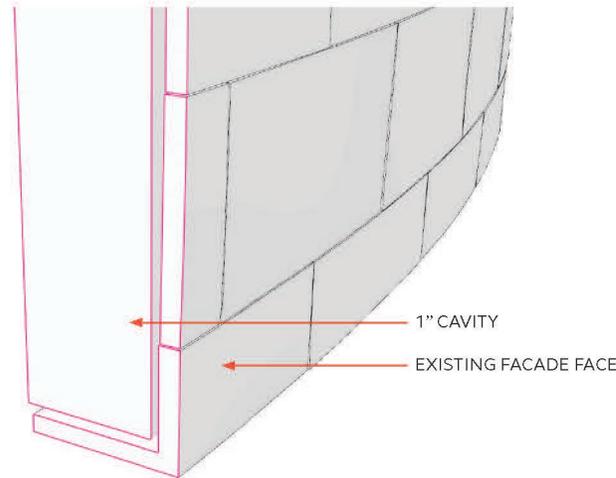
## Precast panel cavity width and proposed 3" facade offset

The Hirshhorn's existing enclosure system completely lacks a vapor, air, or water-resistive barrier, and insulation. This condition results in ongoing water infiltration and condensation during the cold months of the year along the interior side of the solid concrete structural back-up wall. The field survey confirmed the minimum existing average cavity dimension is one inch.

To improve energy performance the Design Team used prescriptive Energy Code requirements to define the minimum thickness of the required wall assembly. This assembly will prevent water infiltration and condensation on the interior of the building.

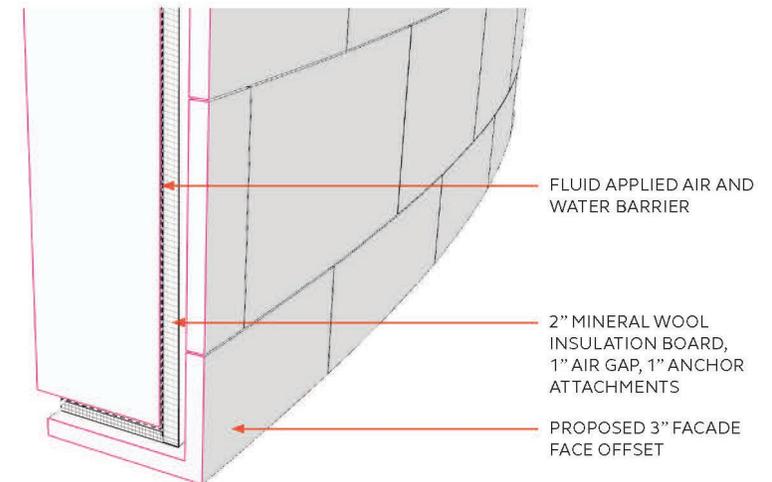
- 32" Concrete backup wall
- Fluid Applied Air and Water Barrier
- 2" Mineral wool board insulation
- 1" Air Gap
- 1" Anchor Attachment
- 5" Minimum precast panel thickness

The proposed 3" facade offset will result in a minimum cavity width of four inches to accommodate 2" thick insulation, a 1" air gap, and 1" for the anchor attachments as well as unforeseen conditions. The new precast panel attachment details will meet blast requirements.



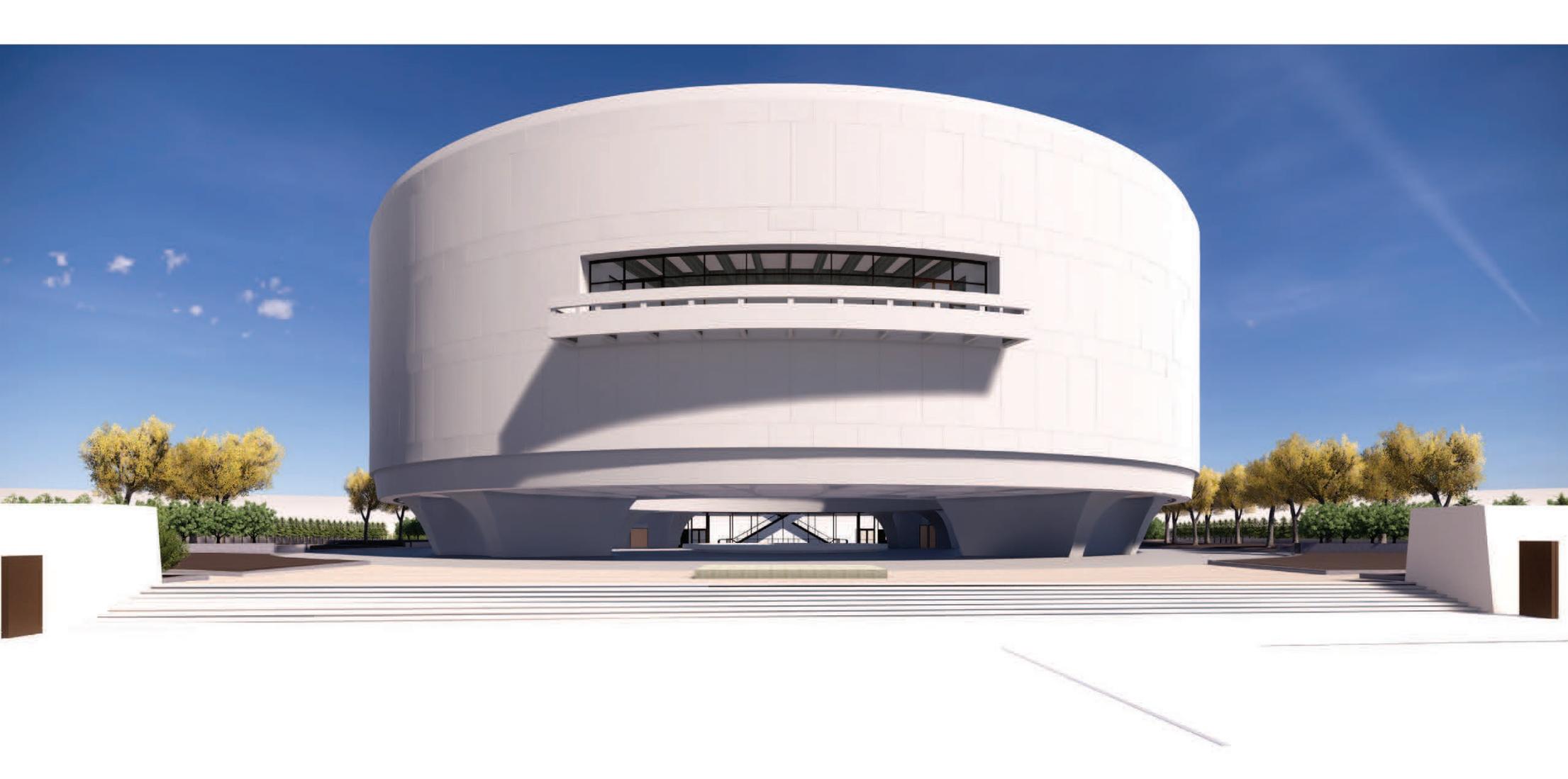
### EXISTING CONDITION

The cavity between the existing precast panels and the back-up structural wall varies. The minimum existing average dimension is one inch.

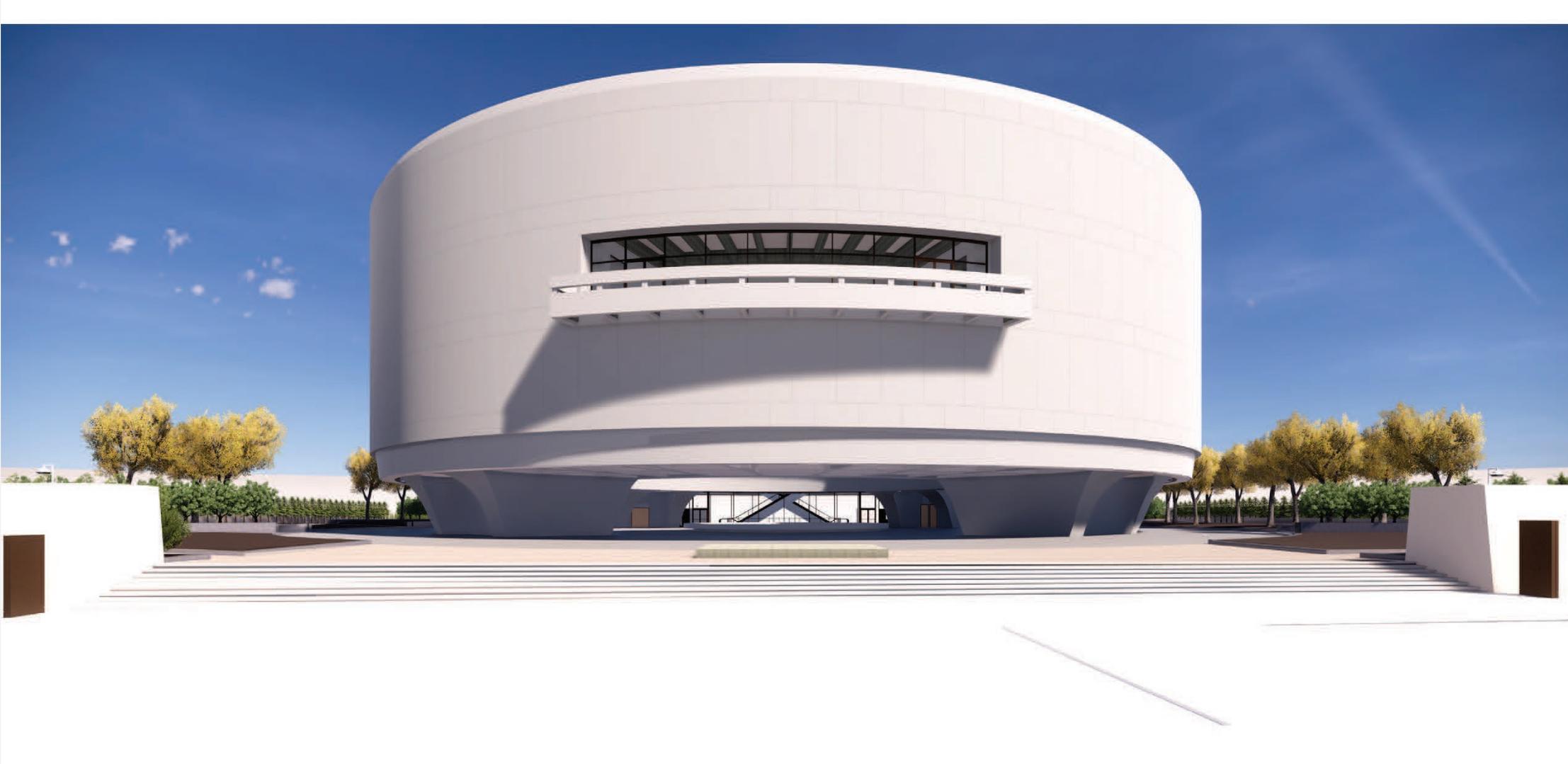


### PROPOSED NEW PRECAST PANELS WITH 3" OFFSET

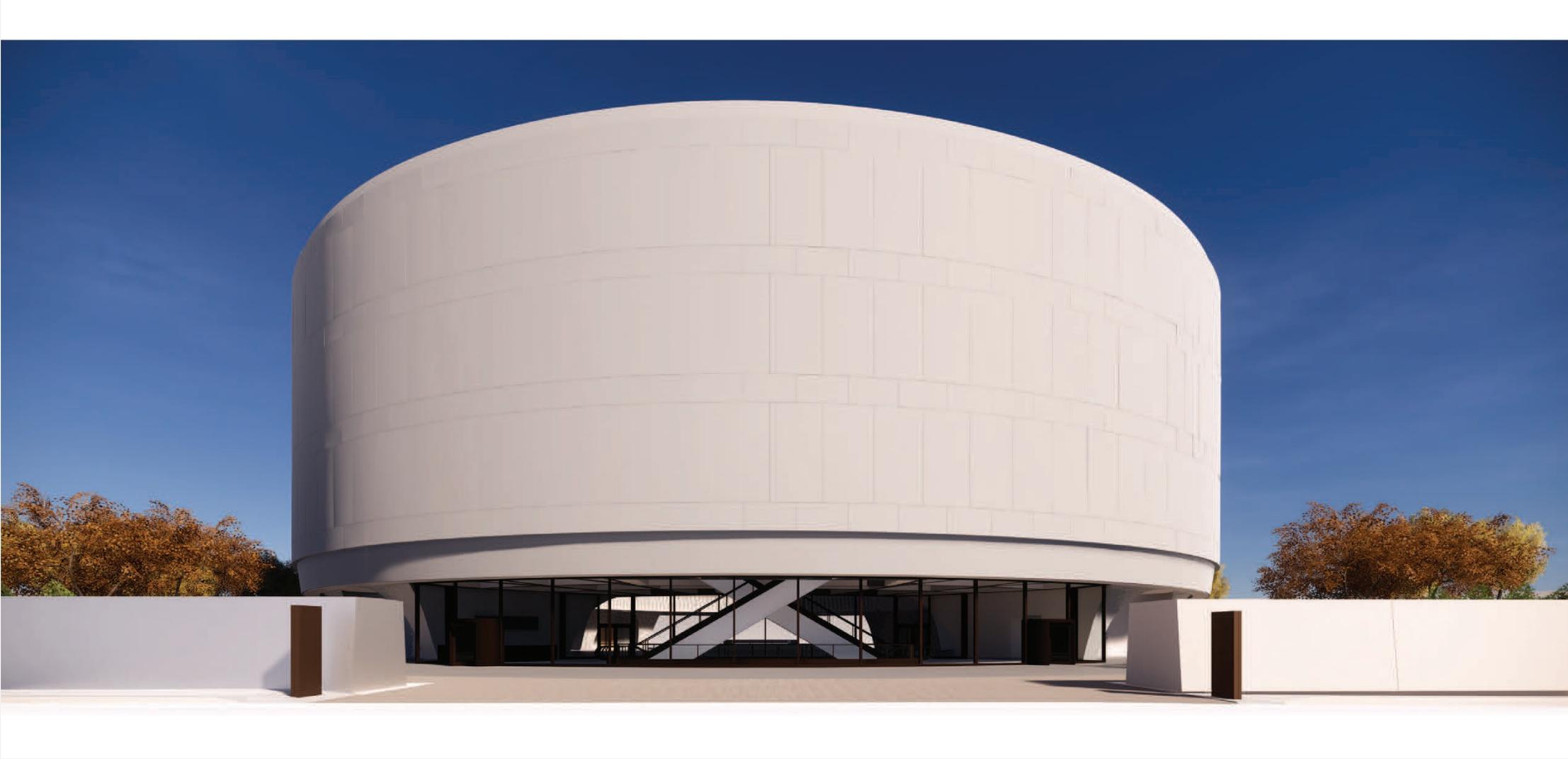
# Existing North Elevation



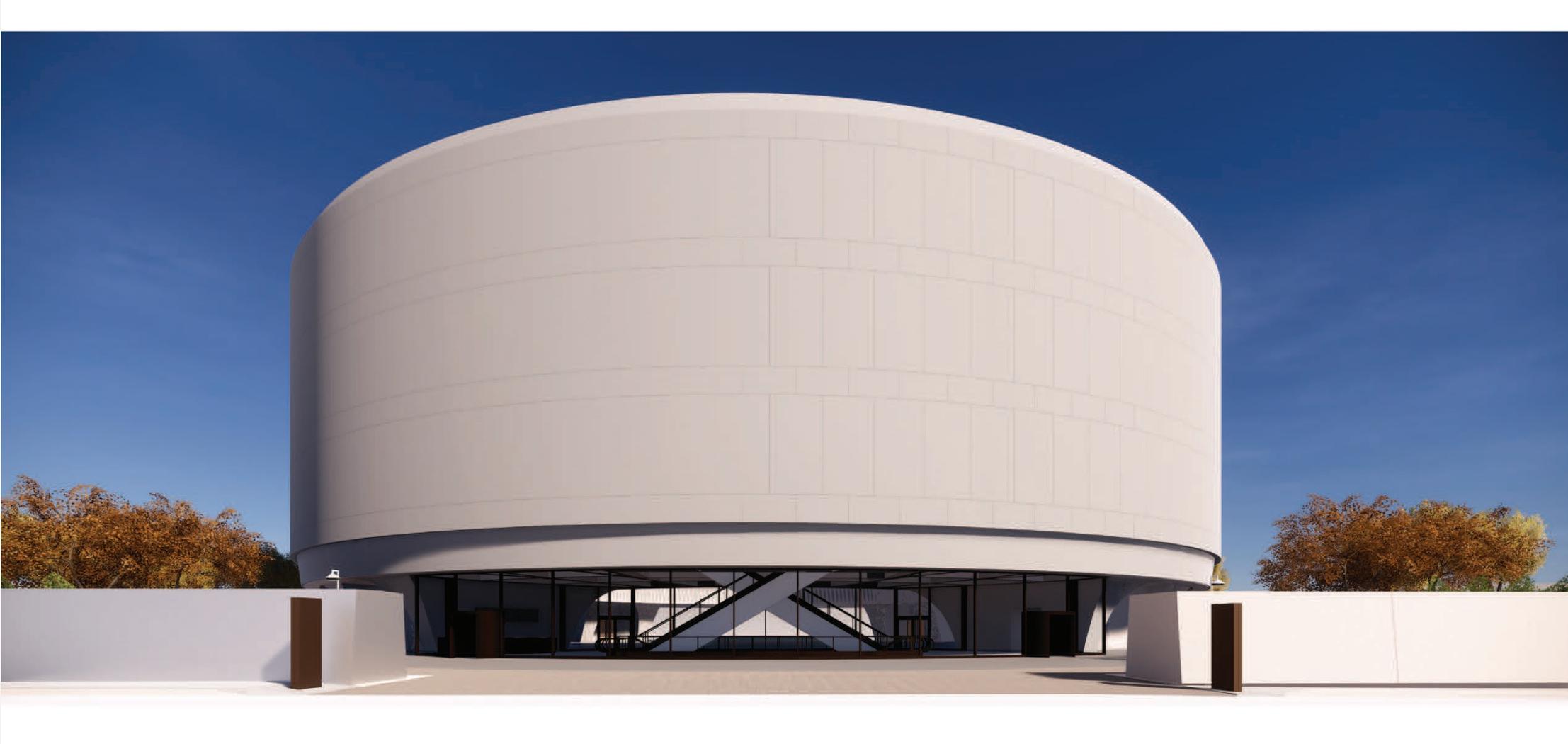
# Proposed North Elevation



# Existing South Elevation



# Proposed South Elevation



# Existing Entrance Detail



# Proposed Entrance Detail



# Proposed Aggregate Material



## **1. KANNAPOLIS QUARRY AGGREGATE | SALISBURY, NC**

According to SI Records, the original aggregate used for the HMSG precast panels was quarried in Salisbury, North Carolina and was called Swenson Pink Granite. The Swenson Pink Granite is available today as Salisbury Pink Granite but is not available as aggregate (this stone is sold only in blocks). The Design Team confirmed that Kannapolis Granite, from the Kannapolis Granite quarry located in the Salisbury North Carolina area, closely matches Salisbury Pink Granite and is commercially available as aggregate.



## **2. STONY CREEK QUARRY AGGREGATE | STONY CREEK, CT**

During the HMSG Envelope Testing and Investigation Project (2016-2019), a specialist Conservator developed a report describing the existing building materials and alternative material sources. Stony Creek granite, provided by Stony Creek Quarry (located in Stony Creek, CT), was identified as alternative aggregate for the precast facade panels.

# Aggregate Analysis

The Smithsonian has initiated a cleaning project for limited areas of the facade to confirm the facade material appearance. Once these facade areas are properly cleaned, SI will develop material samples. These will be shared with external agencies prior to final approval. Current progress samples indicate that the proposed aggregate appears to closely match the existing precast panel material. The color of the concrete matrix will be confirmed once the facade surface is cleaned.

Existing building cast in place concrete



1. KANNAPOLIS QUARRY AGGREGATE | SALISBURY, NC  
Progress material sample

Existing building cast in place concrete

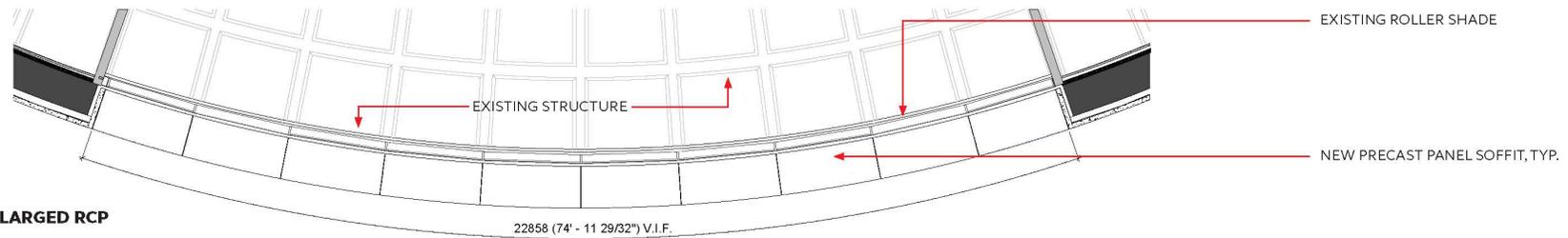


2. STONY CREEK QUARRY AGGREGATE | STONY CREEK, CT  
Progress material sample

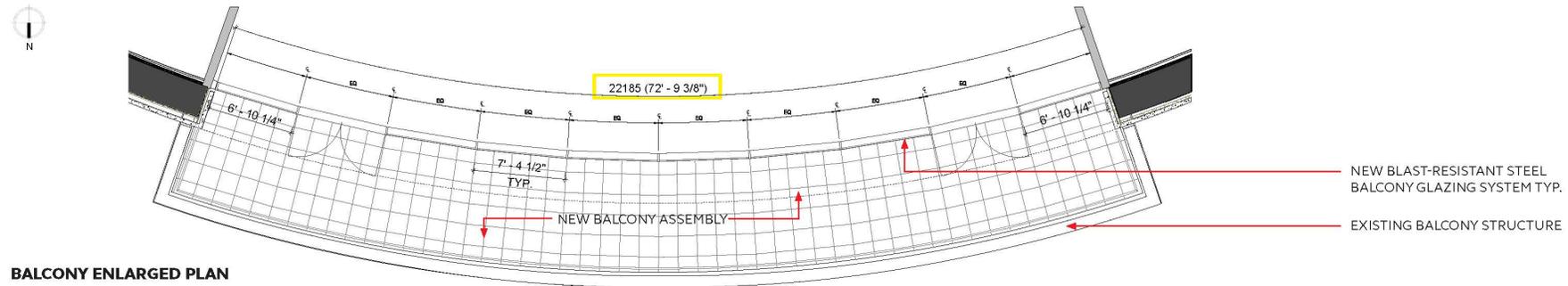
# Balcony Glazing Replacement

## BALCONY GLAZING REPLACEMENT I PLAN, RCP and ELEVATIONS

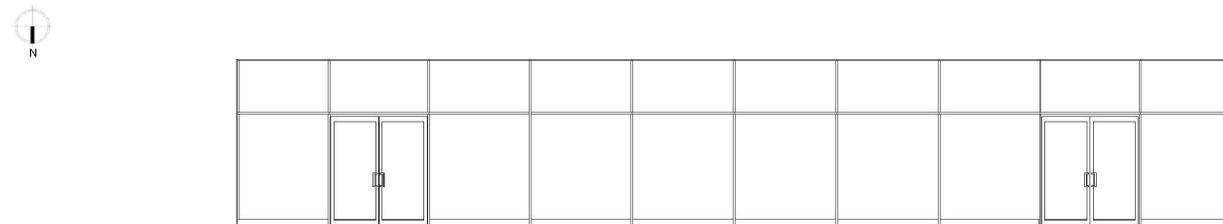
All dimensions of the balcony glazing system geometry will match the existing conditions except the overall width of the glazing system will be reduced by the 3" facade offset on the west and east end of the glazing. The glazing system will meet blast requirements.



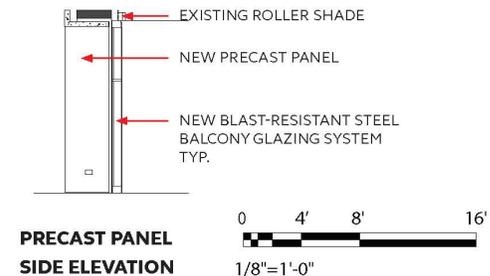
**BALCONY ENLARGED RCP**



**BALCONY ENLARGED PLAN**



**BALCONY STOREFRONT ENLARGED ELEVATION**

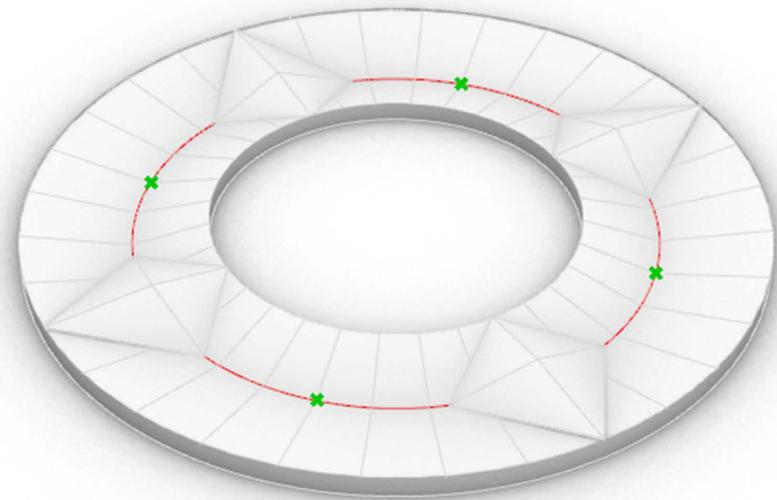


# Roof Replacement

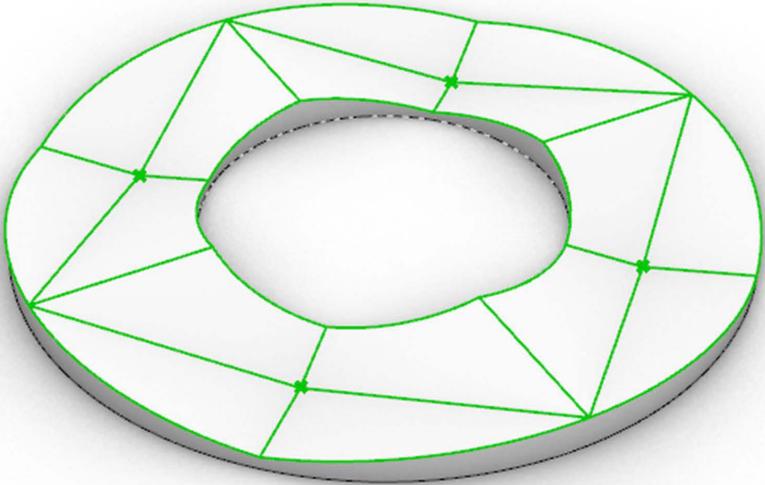
## ROOF REPLACEMENT | EXISTING AND PROPOSED ROOF DRAINAGE PROFILE

Through digital analysis, the design team sought to improve the roof drainage profile to achieve a 1/4 in. per ft. slope wherever possible while considering loading limitations onto the roof slab below and accepting lower slopes where necessary. The design team chose hot-applied rubberized asphalt as the

basis-of-design roofing type. Hot applied rubberized asphalt will provide acceptable performance at lower slopes, thereby reducing structural demands with a thinner bonded overlay requirement.



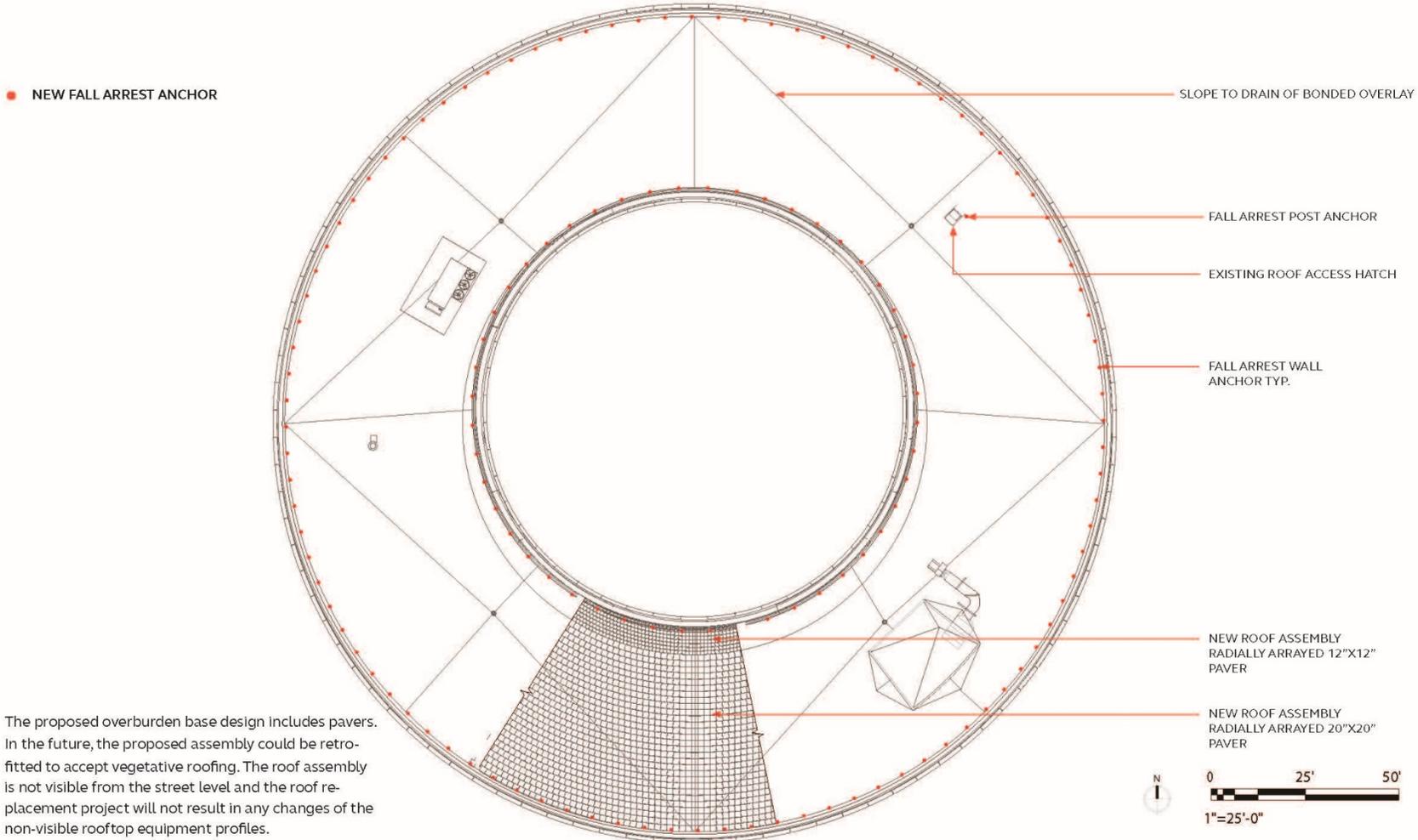
EXISTING ROOF DRAINAGE PROFILE



PROPOSED ROOF DRAINAGE PROFILE

# Roof Replacement

## ROOF REPLACEMENT | PROPOSED ROOF PLAN



The proposed overburden base design includes pavers. In the future, the proposed assembly could be retro-fitted to accept vegetative roofing. The roof assembly is not visible from the street level and the roof replacement project will not result in any changes of the non-visible rooftop equipment profiles.

# CFA 20/JUN/19-1

**LOCATION:**

Independence Avenue and 7th Street, SW  
Washington, DC

**OWNER:**

Smithsonian Institution

**PROPERTY:**

Hirshhorn Museum and Sculpture Garden

**DESCRIPTION:**

Facade replacement and repair

**REVIEW TYPE:**

Concept

**SUBMITTED DOCUMENTS:**

[Hirshhorn presentation](#)

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## Letter

27 June 2019

Dear Ms. Chiu:

In its meeting of 20 June, the Commission of Fine Arts reviewed a concept submission for the replacement of the facade and other exterior improvements to the Hirshhorn Museum at Independence Avenue and 7th Street, SW.

The Commission approved the submission, commenting that the proposal to create a higher-performing building envelope with thermal and moisture protection, while honoring the original design by Gordon Bunshaft of SOM, is the appropriate approach for this iconic Modern building. The Commission members also commended the Smithsonian for its stewardship in undertaking these exigent improvements to its existing facilities.

The Commission looks forward to the final review of this project. As always, the staff is available to assist you with the next submission.

Sincerely,

/s/Thomas E. Luebke, FAIA  
Secretary

Melissa Chiu, Director  
Hirshhorn Museum and Sculpture Garden  
Independence Avenue and 7th Street, SW  
Washington, DC 20560

cc: Kirill Pivovarov, CallisonRTKL