THE PORTLAND BUILDING
RECONSTRUCTION PROJECT

DAR #2
DESIGN ADVICE REQUEST

December 19, 2016

Howard S. Wright
a Balfour Beatty company
DLR Group
City of Portland, Oregon 1851

DESIGN ADVICE REQUEST #2

TABLE OF CONTENTS

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PROJECT TEAM

The Portland Building

The Portland Building is an iconic example of the postmodern architectural style by renowned architect Michael Graves. The result of a design competition chaired by Philip Johnson, the Portland Building was one of Graves' earliest public buildings. The building was individually listed on the National Register of Historic Places in 2011 as a notable work by a master architect and as an early influential work of Postmodern Classicism. As such, the Portland Building qualified for listing under special consideration for properties that have achieved significance in the past 50 years.

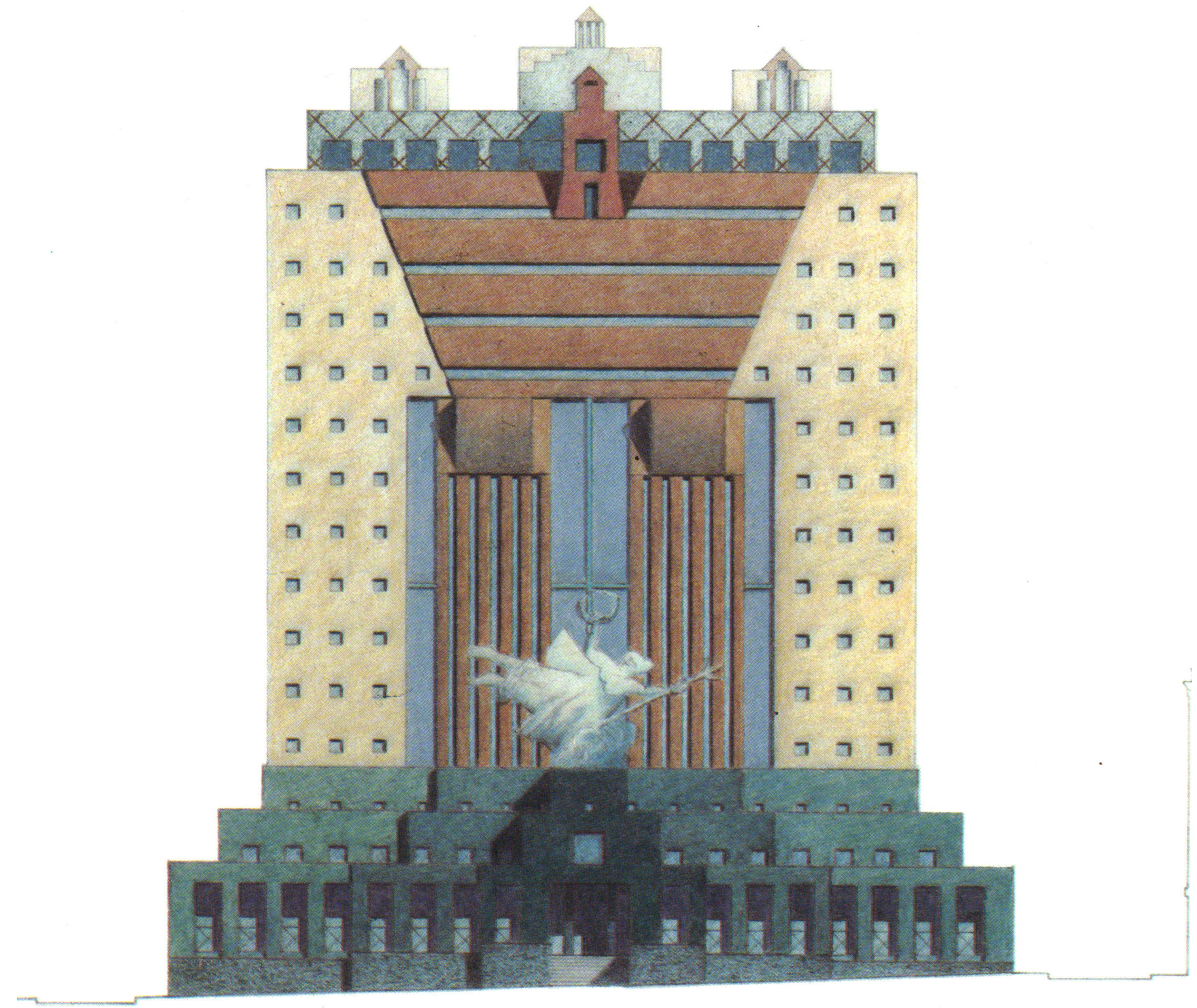
The original design and construction of the Portland Building was fraught with hurdles and complexities. One of the major design drivers for the project was the City's limited budget. The final project was completed for a total of $28.9 million, including furnishings, or approximately $72/per square foot. Even at the time it was built, this represents approximately half of what a comparable office building would have cost. In addition, it was an early example of a design-build process involving a project management firm, two architects, two contractors and an engineering firm. Multiple changes occurred throughout the design and construction process. Some of these changes were documented, while others have been discovered during various investigations over the years.

The energy crisis of the mid-1970s caused the City to grant additional scoring points to competition entries with fewer and smaller windows to increase energy performance. Based on the common wisdom and technologies available at the time, this decision had a large impact on how the competition entrants treated glazed areas. Michael Graves himself noted that his design provided limited window openings and heavy tint in order to meet the energy conservation goals stated in the competition brief.

The result of these issues is that the Portland Building has suffered from numerous technical and performance deficiencies requiring both structural and building enclosure remedies. These deficiencies became evident shortly after its completion in 1982. The small windows and dark tinted glazing, originally chosen for energy conservation, have created a dark and unpleasant working environment for the building's inhabitants.

Over the past 34 years, the City of Portland has commissioned multiple studies and has performed multiple repair projects in an attempt to stop water infiltration. The majority of these piecemeal efforts have failed to solve the building's problems. In 2012, a comprehensive building envelope study was done that looked at the building exterior and structure holistically for the first time. The results of this assessment work demonstrated that the issues facing the Portland Building envelope are systemic and cannot be solved with simple repairs to individual materials or components. While this assessment did contain some preliminary thoughts as to how the issues could be remedied, it should be noted that this work was done at a conceptual study level and was not intended to represent a fully designed and vetted solution.

In 2016, the City of Portland engaged the design-build team of DLR Group and Howard S. Wright to perform a "reconstruction" of the existing Portland Building that would first and foremost provide a long-term and weather-tight building enclosure. As part of the concept design process, the team held multiple charrettes and engaged with professional consultants and trade partners to look deeper into the existing conditions and develop workable solutions that would achieve the project goals. The team brought to the table a wide range of expertise in building enclosures, historic preservation and high-rise envelope systems construction. With these major project concerns represented, the team was able to thoroughly investigate the issues and come to consensus on an envelope system that would save the Portland Building and transform it into a functional and healthy asset for the community. The recommendations that resulted from this effort are the basis of this submission.



PROJECT BACKGROUND

Letter from Michael Graves Architecture and Design

The team also reached out to Michael Graves Architecture and Design (MGAD) as the original designers of the Portland Building to discuss the proposed reconstruction project and review the proposed solution. While Michael Graves is deceased, design staff who worked with him during the Portland Building design and construction process are now leaders of the firm and were able to provide insights into the original intent and process as well as engage in a dialog about the proposed solution. As part of this outreach, the DLR/HSW team shared with MGAD this Design Advice Request package for their review.

In our conversations, Michael Graves' team members conveyed that at the time the Portland Building was designed, it was a reaction to the approach to urban architecture that was prevalent at the time. Their goal with the Portland Building was to make a building that was "friendly and joyful" and expressed a sense of "unleashed exuberence".

Following is a letter of support from Patrick Burke, Senior Principal at Michael Graves Architecture and Design.

MG A&D

MICHAEL GRAVES
ARCHITECTURE & DESIGN

December 1, 2016

To Whom It May Concern,

I have spoken with Carla Weinheimer and Erica Ceder of DLR Group and understand that The City of Portland may be undertaking a major renovation of the Portland Building designed by our office. They have shared their strategies and a draft of their report with me and I was impressed to see what a thorough, realistic and respectful proposal they have produced. We enthusiastically support the proposed recommendations that the DLR Group and Howard S. Wright are submitting in their report labeled DAR #2 and dated December 19, 2016. We do care a great deal about The Portland Building and are pleased to see such a comprehensive approach to renovating the building.

At the time The Portland Building was designed I was in graduate school and one of Michael Graves' students at Princeton University. The project was an extremely important contribution to architecture at the time and much discussed by everyone in academia and the profession. After graduate school I started working in Michael's office in February, 1982 and The Portland Building was under construction at that time. That period of time that we were working on The Portland Building was an extremely important moment in academia and in our firm's history.

I would also like to note that from our perspective as the designers of The Portland Building we would be happy to see the building improved and modernized and do not believe that all the details would necessarily need to be slavishly replicated. For example, the windows should be updated to clear glass and not simply match the original black glass --- and if the size of the glass area can be increased a bit that would be for the better. I think the DLR Group and Howard S Wright recommendations strike this appropriate level of balance between respect and improved performance.

Finally, Michael Graves had often discussed with us that he wished there was a way to renovate The Portland Building comprehensively and not as a series of local patch repairs, and he asked me several times if I had any suggestions. I know that Michael Graves would also have been supportive of this proposal and thrilled to see this happening.

We would be happy to be part of the conversation for this renovation project. Feel free to contact me at any time.

Wishing you all the best in this endeavor.

Sincerely,

Patrick Burke

Patrick Burke AIA
Senior Principal

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LETTER OF SUPPORT

Previous Historic Landmarks Commission Hearings

The Portland Building has been presented to the Historic Landmarks Commission on two previous occasions in the last four years.

Briefing #1 – November 26, 2012 (Presented by FFA Architecture and Interiors, Inc.)

Items Presented – The presentation was given to the Landmarks Commission in the form of a briefing with the purpose of introducing the Commission to the Portland Building and its many issues. FFA presented information that had been collected up to that point as part of the exterior condition assessment work. The main focus of the presentation was to show the nature and severity of the damage to the exterior envelope caused by the building's ongoing water infiltration issues. The briefing was given prior to completion of the report and did not include formal recommendations. However, the possibility of extensive material replacement was introduced. The presentation also touched on how preservation techniques for modern/postmodern buildings might differ from more traditional approaches.

Feedback received – The presentation was given for informational purposes and did not request feedback from the Commission.

DAR #1 – January 11, 2016 (Presented by Kristin Wells, City of Portland, Office of Management and Finance)

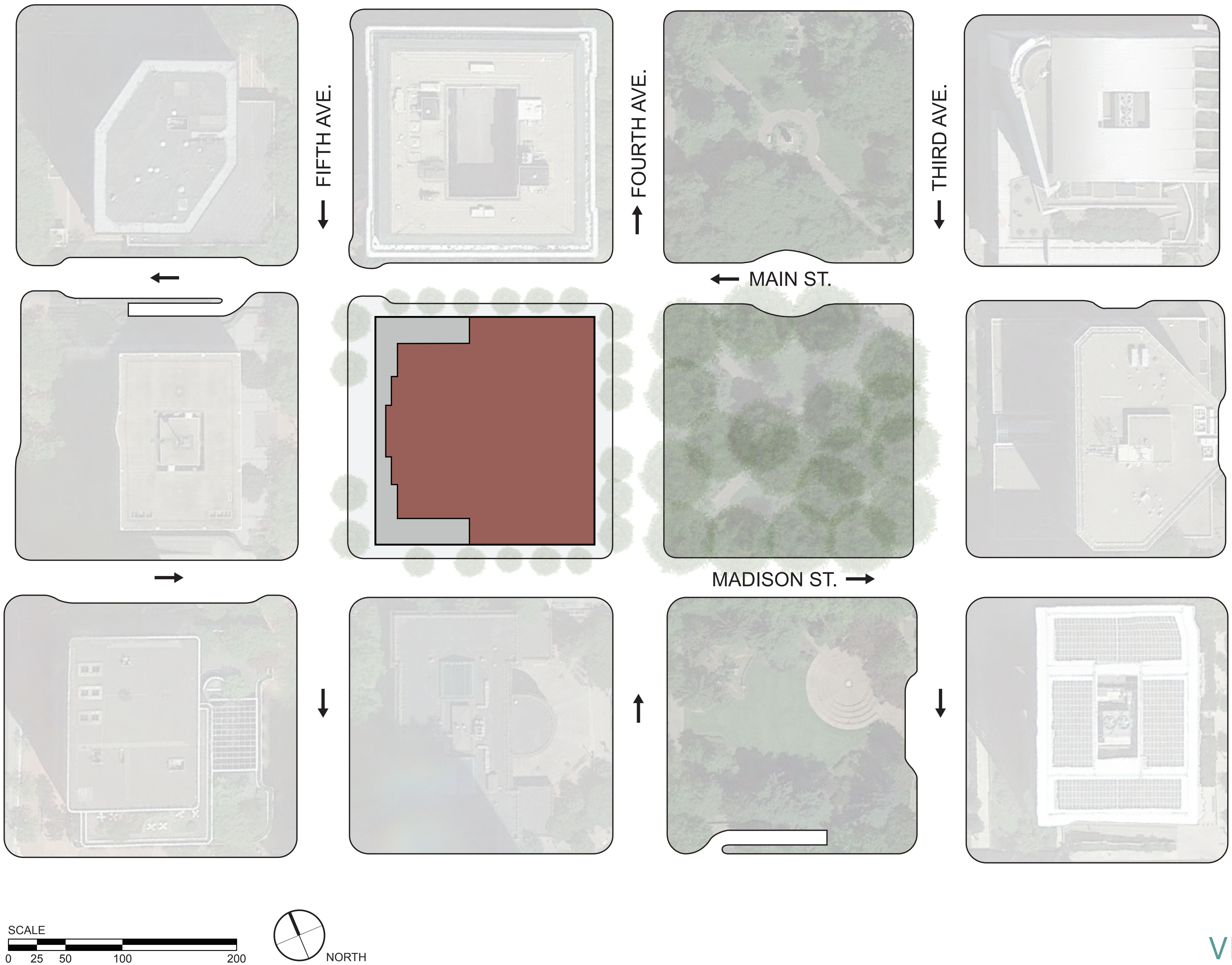
Items presented – This presentation was given in the form of a Design Advice Request hearing that built upon the information provided in the previous briefing and introduced information from additional assessment studies commissioned by the City with potential design solutions. The City provided a recap of the exterior enclosure issues presented in the first briefing as well as introduced some of the findings of the interior and MEP systems study. The City further presented the following potential design solutions for review and comment from the Commission:

- i) Full replacement of all windows and curtainwall systems with more energy efficient (double glazed) and thermally broken systems with clear glass to improve occupant comfort
- ii) Removal of the interior furring walls and spandrel glazing to increase visible glass area inside the building
- iii) Full replacement of the ceramic tile systems with a new rainscreen system
- iv) Infill of all or a portion of the existing loggia with new interior space to provide a more inviting space
- v) Eliminate or reduce vehicle parking and modify the Fourth Avenue parking garage entrance to provide a more pedestrian-friendly experience or potentially to become a pedestrian-only entryway. The idea of replacing the concrete "blind windows" on this façade with glazing or as opportunities to integrate art installations was also discussed.

Feedback received – The Commission provided the following feedback:

- i) Window/Curtainwall replacement – Commission was generally supportive of replacing glazing systems with more energy efficient options. The idea of reducing the degree of or eliminating the tint from the glazing was also supported if it would not result in the interior floor lines becoming visible and breaking up the vertical appearance of the curtainwalls from the exterior. Keeping the reflectivity at the east- and west-facing curtainwalls was encouraged.
- ii) Removal of interior furring wall behind curtainwall – The same concern listed above regarding the visibility of the interior floor lines from the exterior was expressed as the floor lines occur in the middle of the glazing panes.
- iii) Ceramic tile replacement – Commission was generally supportive of replacing the tile if it matched the existing in color, size and sheen. The Commission expressed concern with the insertion of a rainscreen system behind the tile and the potential change in the dimensional relationship of the various exterior building elements, but was understanding of the need for a technical solution.
- iv) Loggia modifications – The Commission expressed support for infilling the loggia at the north and south sides of the building, as these portions are already truncated. The loggia along the west side of the building was deemed a significant feature, and the commission encouraged improvements to furnishings and/or lighting to improve the environment.
- v) Fourth Avenue modifications – The Commission was very supportive of eliminating vehicle access/parking along this façade. Any new entry integrated into this facade would need to be compatible with the architecture, but also differentiated. The idea of replacing the "blind windows" with glazing was met with support. The potential of integrating a significant art piece on this side of the building would need to be done with the understanding that it not compete with the architecture.
- vi) General comments – Commissioners noted that the building is based on the square and that the modulations are important to maintain as well as the colors. Commissioners were also supportive of eliminating the street trees directly in front of Portlandia to increase visibility of the statue.

SUMMARY OF PREVIOUS HEARINGS



Zoning Summary

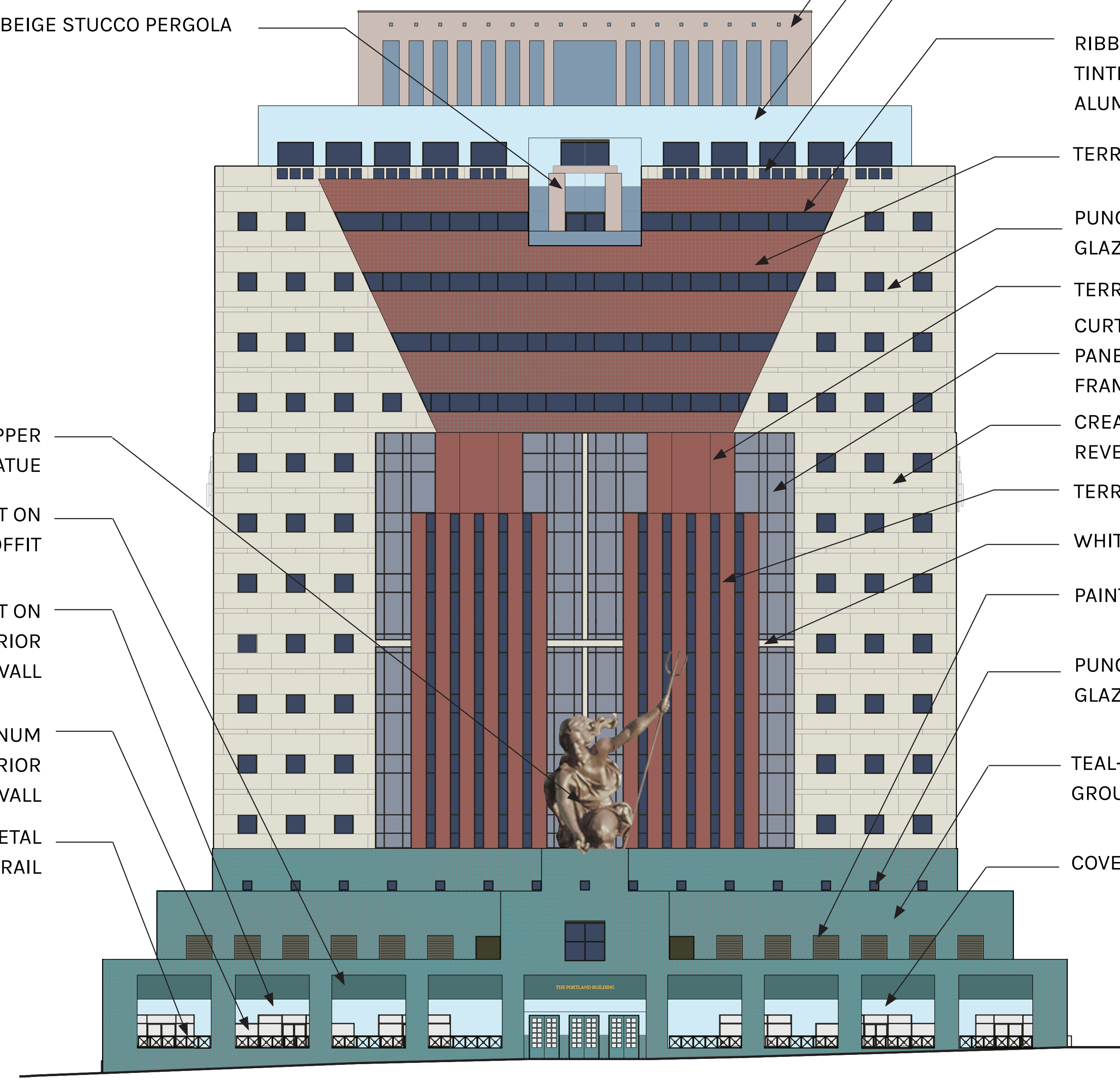
Applicant:	City of Portland - Office of Management and Finance 1120 SW 5th Ave #1200 Portland, OR 97204 Contact: Kristin Wells
Representative:	DLR Group 421 SW 6th Ave, Suite 1212 Portland, OR 97204 Contact: Erica Ceder
Owner:	City of Portland Managed by the Office of Management and Finance
Site Address:	1120 SW 5th Ave Portland OR 97204
Property ID:	R246103
Tax Lot:	Block 57, Lot 1-8, Sub-Acct R508653 (R667706771)
Base Zone:	CX - Central Commercial
Overlay:	d - Design Zone
Historic Resource:	Individual National Register Resource
Plan Dist:	Central City Plan District - Downtown
Procedure:	Type III Historic Resource Review
Pre-App Conf:	November 30, 2016

VICINITY MAP/ZONING INFO

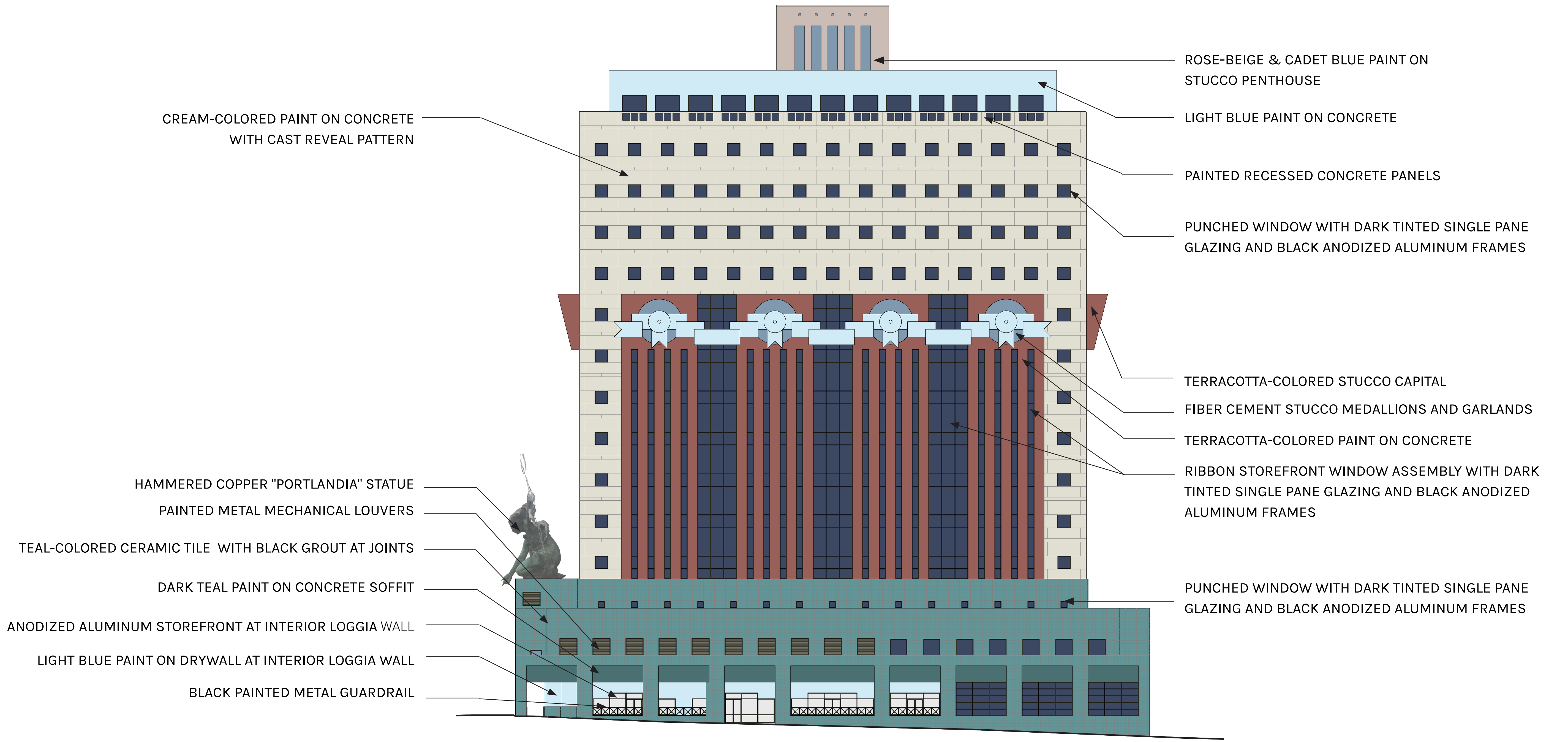
Existing Building Composition

The Portland Building is composed in a classical tripartite arrangement of base, shaft and capital. The facades are composed such that the east and west faces are similar to one another as are the north and south. The base component consists of three floors that step in a "wedding cake" style toward the shaft. All three floors of the base are clad in a teal color square tile set in a grid pattern. The ground level of the base contains a covered loggia on the west side of the building that partially wraps the north and south sides as well. The shaft or tower portion of the building is primarily a square concrete tower painted a cream color. The concrete contains a pattern of cast reveals that give the impression of joints. On the east/west facades, a central curtainwall area is centered underneath a red tile clad "keystone" element. This keystone sits atop two "column" elements with projecting wedge shaped capitals. The curtainwall glazing in this area has a reflective coating and is divided into four quadrants by a white band.

The north/south facades feature four "columns" composed of thin concrete pilasters divided by strips of curtainwall glazing. The capitals of these columns are connected by a medallion and garland motif that is composed of a fiber-cement stucco over metal framing and applied to the face of the building. The top floor of the building steps in further from the shaft and, along with the rectangular mechanical penthouse, creates the capital of the building.



EXISTING ELEVATION MATERIALS - WEST (SIMILAR AT EAST)



EXISTING ELEVATION MATERIALS - SOUTH (SIMILAR AT NORTH)

Existing Building Condition

The Portland Building's issues are extensive and well documented. Deficiencies in the building envelope caused chronic water infiltration, resulting in harmful moisture inside the building and premature deterioration outside. Leaks into the inside compromised occupants' comfort and led to ongoing interior maintenance problems. The resulting exposure to water generated staining, efflorescence, cracks, corrosion and a degradation of some of the attachment of the tile to the concrete wall.

Reversing the decline of the Portland Building's condition, upgrading its serviceability and extending its useful life require a long-term remedy for leaks and degradation beyond the capabilities of strict preservation of existing conditions. Decades of repair attempts have failed to provide a permanent solution. Since construction finished in 1982, repeated efforts to fix problems using methods that preserved the original materials did not stop leaks or prevent recurring symptoms. They sometimes marred the building's original appearance while leaks re-occurred, and degradation spread. These failed repair efforts have proven that continual short-term repairs to treat symptoms do not address the root cause. Building envelope deficiencies and resulting degradation originate in the Portland Building's inherently flawed construction and the industry's not yet developed understanding of enclosure science at the time it was built.

Past re-caulking, repointing, re-coating, retiling, re-patching, re-glazing, and re-gasketing to try to restore the facade's fabric failed to fix problems and at best masked symptoms for a short time. Repeating those repairs is unlikely to change outcomes because the Portland Building is not built like, and does not behave like, a traditional mass masonry building.

Refined over centuries, the technology of load-bearing masonry enclosures minimizes leaks into their insides by absorbing and holding moisture, like a reservoir, until drying by breathing the moisture back out. Periodic restoration by traditional techniques like repointing and selectively replacing masonry units effectively preserves those types of buildings and their weathering mechanisms by restoring the reservoir and its water-shedding features.

The Portland Building has a mostly exposed reinforced concrete enclosure. Its construction lacks water-shedding details prevalent on many historic masonry buildings. Understanding of the performance limitations of this type of wall system was still evolving in the 1980s, and it is now known that concrete in this application does not resist weathering well. A reinforced concrete wall cannot be a reservoir because absorbed moisture induces corrosion and carbonation of the reinforcing steel within that can exert stresses and destroy it; so concrete must be protected by a barrier.

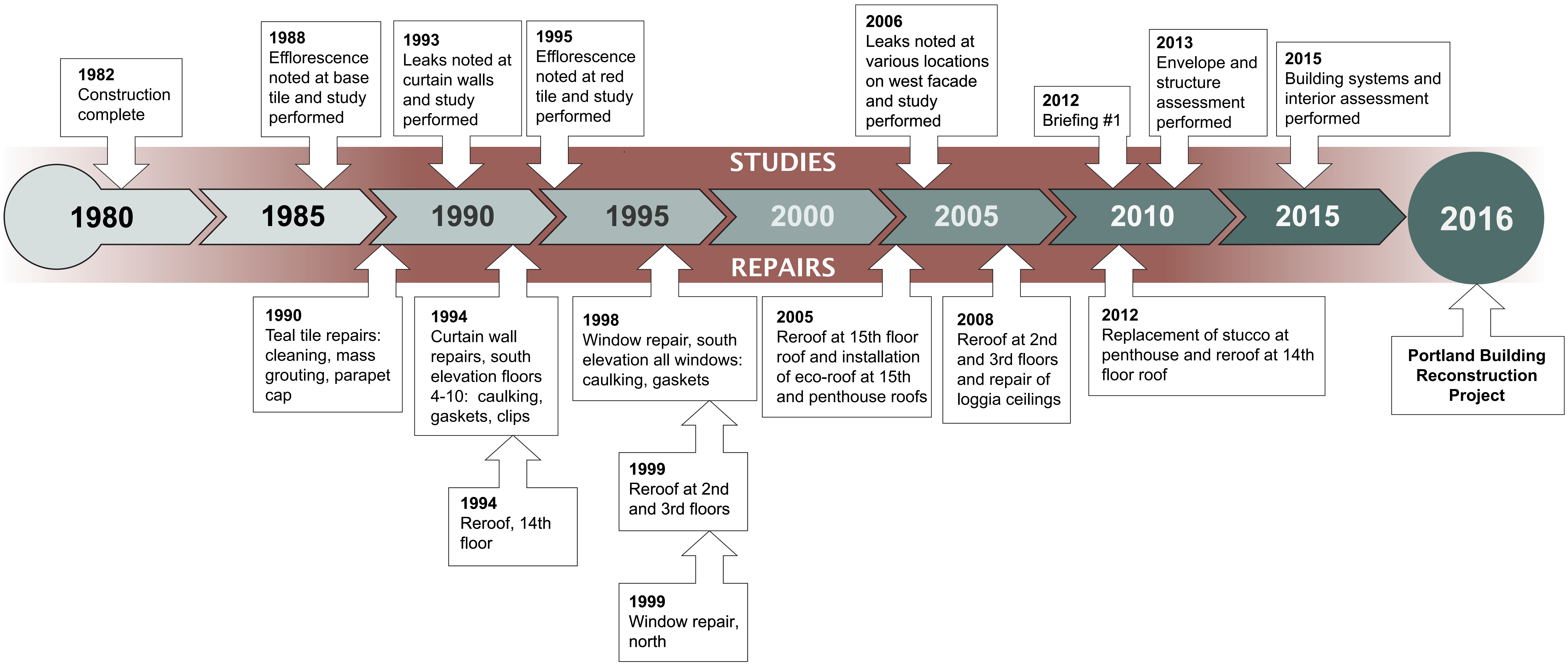
The Portland Building's dense but relatively thin concrete walls cannot resist water and thermal penetration by acting as reservoirs, therefore the building has been forced to rely on paint, grout, tiles and caulk to create a barrier against water intrusion/absorption. Ultimately these materials are by nature only temporary and rely on nearly flawless application in the field to function properly.

Perhaps the most notable aspect of the Portland Building's construction is the fact that it has no exterior finish or cladding on the structural concrete tower other than paint. While there is plenty of precedent for painted concrete buildings, it is extremely uncommon for a building of this height and scale. The fact that the building also attempts to combine this concrete barrier type wall with curtainwall systems further separates it from typical construction techniques. Curtainwall systems by nature are designed to manage a certain amount of water infiltration that they then are equipped to drain back to the outside. Barrier walls need to prevent water from entering the system at all. The integration of these two types of systems creates problematic details where the two types of systems come together. The barrier wall has no mechanisms that would allow it to tie in with the curtainwall system; therefore, a sealant joint becomes the only protection at these transitions.

The following pages serve to further elaborate on the types and severity of deterioration that the Portland Building is currently experiencing and to illustrate the many efforts that have been made to remedy these conditions. A more detailed summary of the existing building conditions and deficiencies is included as an appendix to this document.

EXISTING BUILDING CONDITION

History of Studies and Repairs



HISTORY OF STUDIES AND REPAIRS

Openings/Glazing Systems

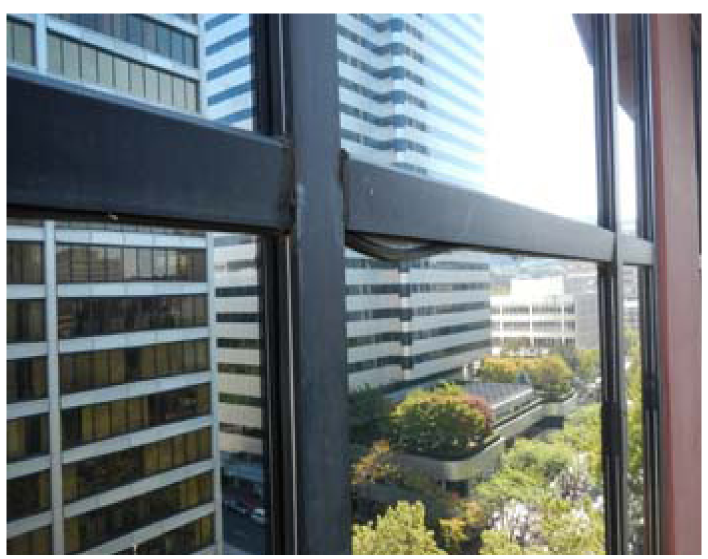
Openings/Glazing Systems - The existing building openings are infilled with four major types of glazing systems: Fixed window units inserted into punched openings, stick built curtainwall systems, ribbon windows and ground level storefronts. Glazing systems are typically single pane and frames are aluminum with no thermal break. Deficiencies noted include:

- Failed curtainwall systems- deteriorated gaskets, deformed mullions, interior drainage systems compromised by the addition of sealant at weep locations, failed flashing, oxidation at metal components,deteriorated perimeter sealant, and water intrusions throughout the system.
- Failed punched windows - deteriorated perimeter sealant, gaps at frame corners and oxidized aluminum components.
- Failed ribbon windows - improper use of a storefront system at upper floors, deteriorated gaskets, failed flashing, oxidation at metal components,deteriorated perimeter sealant, and water intrusions throughout the system.


Failed sealant at punched window perimeter joint


Failed gaskets at curtainwall system


Failed gaskets and oxidized finish at ribbon window frames


Failed gasket and displaced pressure plate/cap at curtainwall


Failed movement splice connection at curtainwall jamb


Failed metal finish at ribbon window head

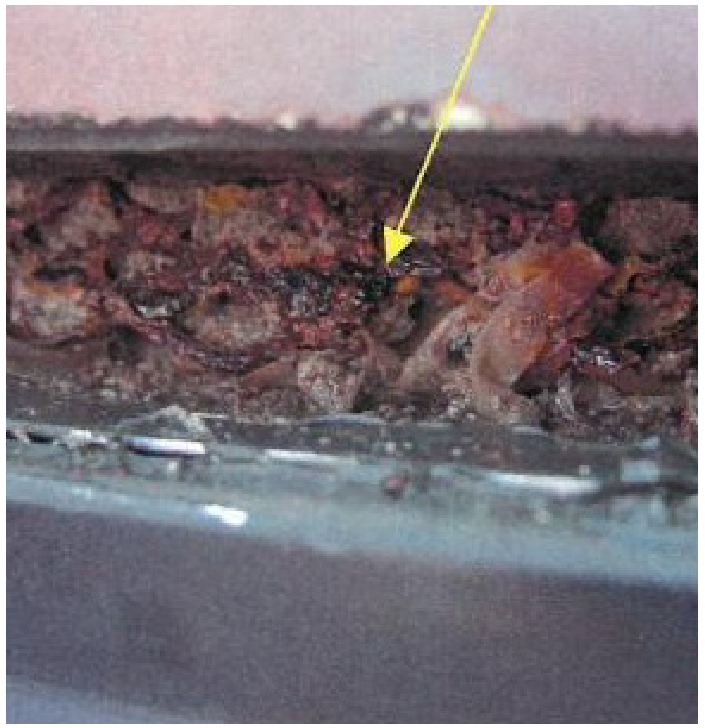

Water infiltration at 14th floor ribbon window

EXISTING BUILDING CONDITIONS

Tile over Concrete

Tile System - Existing tile assembly is composed of glazed ceramic tiles mortared onto a bed layer and metal lath that is in turn fastened to the concrete wall. Some investigations have found a layer of sheet plastic behind the lath; however, there is no functional drainage plane or water management system. Deficiencies noted include:

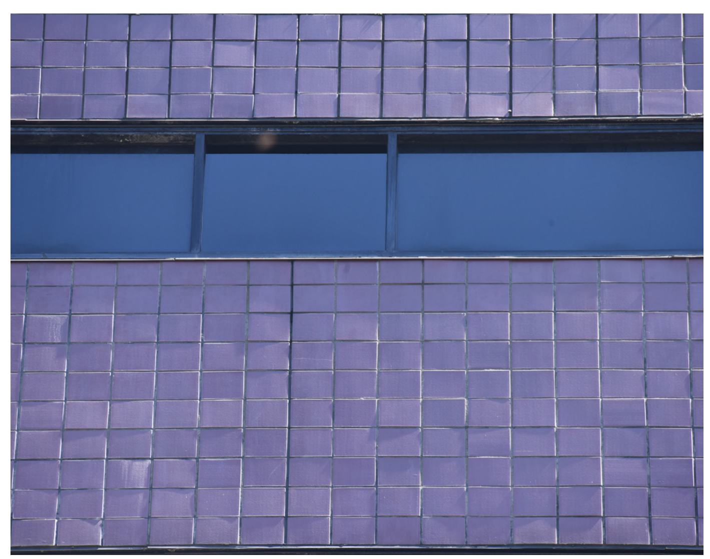
- Failed ceramic tile systems - continuing efflorescence at grout that obscures the intended black color, cracked/broken tiles, improper past re-pointing efforts, deteriorated/cracked grout, areas of rusted metal lath forcing tile out of plane, failed control joints, and biological growth in grout joints.

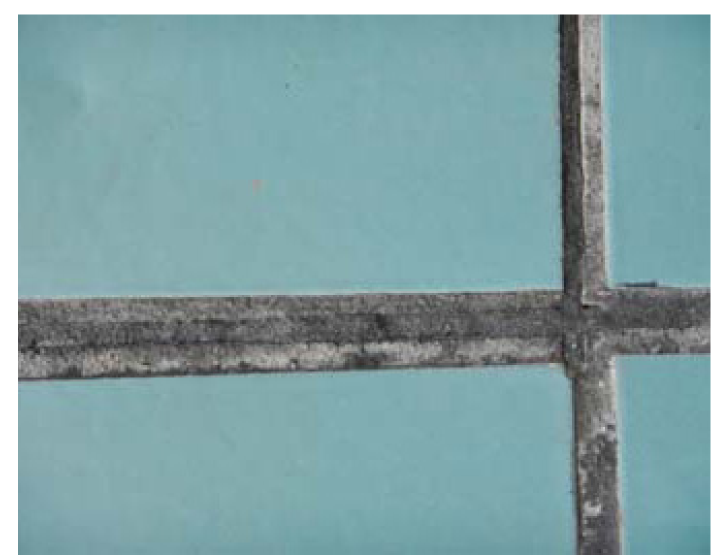

Rusting metal lath expanding behind tile system


Failed sealant at tile system control joint


Out of plane tiles potentially delaminated from wall


Failed grout in joint/efflorescence


Out of plane tiles potentially delaminated from wall


Seams in improperly repointed grout


Biological growth at grout in joints

EXISTING BUILDING CONDITIONS

Painted Concrete

Painted Concrete Walls - Existing exterior walls are solid, reinforced, structural concrete with an elastomeric paint applied to the exterior surface. The interior side of these walls are covered with a furring wall filled with fiberglass batt insulation. Deficiencies noted include:

- Failed elastomeric coating - In many areas, the elastomeric paint (which is the concrete's primary defense from water) has been compromised, allowing water to become trapped behind the paint.
- Spalling concrete - Areas where moisture has infiltrated the coating has forced some patches of the concrete to spall.
- Condensation - The concrete wall has little resistance to exterior thermal conditions. The interior side of the mass wall frequently develops condensation which is then trapped within the furring wall. This creates and ideal environment for microbial and fungal growth within the furring cavity.


Bubbling at elastomeric paint


Insulation discolored by moisture from air or water infiltration


Water staining on interior side of concrete wall


Cracking at exterior side of concrete wall


Failed elastomeric paint and loose concrete edge


Spall and rusted reinforcing at exterior concrete wall


Spall at exterior side of concrete wall

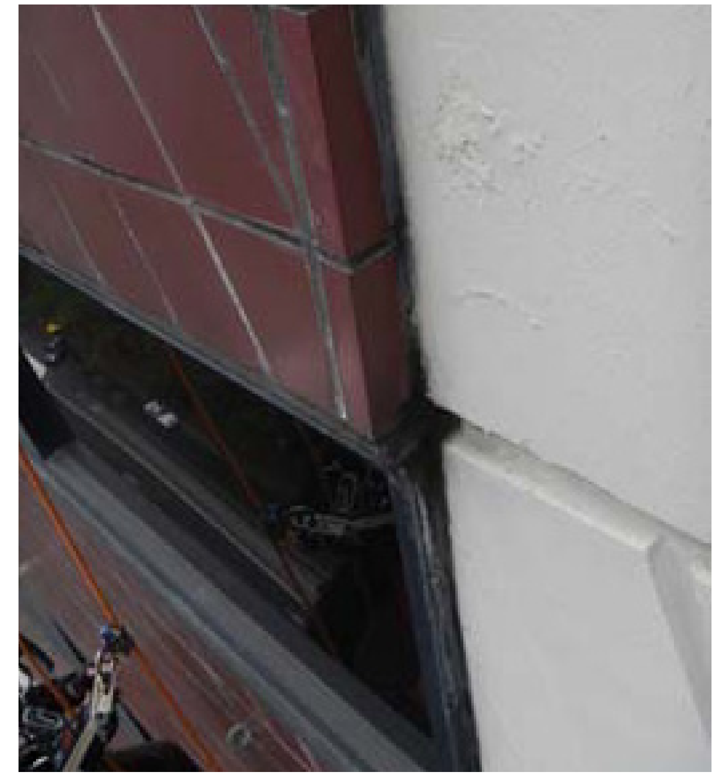
EXISTING BUILDING CONDITIONS

Joints at System Transitions

Existing Joint Treatments - The current building enclosure's resistance to leaks is entirely dependent on the use of sealants at locations where materials and systems transition from one type to another. This means that there is no opportunity to properly manage water through flashing, drainage channels or weeps. Therefore these sealants are the only line of defense against water infiltrating the building. Sealant issues observed include:

- Failed sealant joints - Existing sealant materials are experiencing both adhesive and cohesive failures.
- Improper sealant applications - In many instances, joint repair/maintenance was done by applying new sealant over existing sealant rather than removing it and doing proper surface preparation.
- Sealants applied to weeps - In many locations within the curtainwall assemblies and in some tile transitions, the few system weep holes that are existing have been covered with sealant, exacerbating the water issues.


Adhesive and cohesive sealant failure


Weather tightness of transition dependent on sealant


Sealant applied over curtainwall drainage outlet


Multiple layers of sealant applications


Sealant applied under head flashing


Multiple layers of sealant applications


Complex material transition joints dependent on sealant

EXISTING BUILDING CONDITIONS

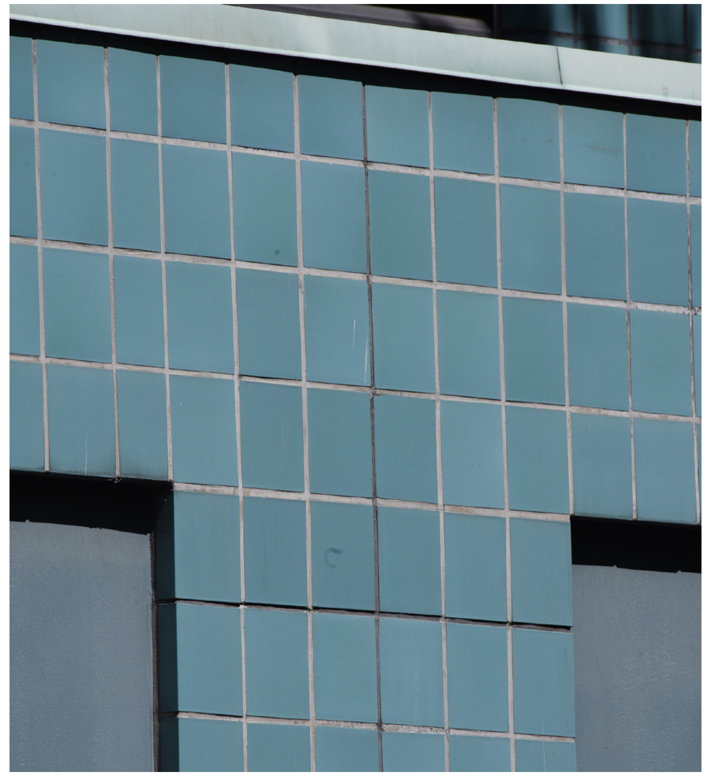
Detail/Dimensional Irregularities

The building design contains multiple features that were intended to maintain a set modularity or alignment. These items were adjusted in several different ways during construction sometimes resulting in undesirable conditions. These variations include:

- Irregular grout joint size - The existing grout joints vary from less than 1/2" to over 1" in width. Wide grout joints are more susceptible to shrinking and cracking.

- Tiles cut for size/shape - Tiles were frequently cut down in areas where openings or other features were intended to align with the tile module. While there are some tiles that were fabricated for specialty conditions like corners, there are many instances where field tiles were cut instead. This resulted in conditions where tile bisque is exposed to the elements and/or grout joints are irregular in width.

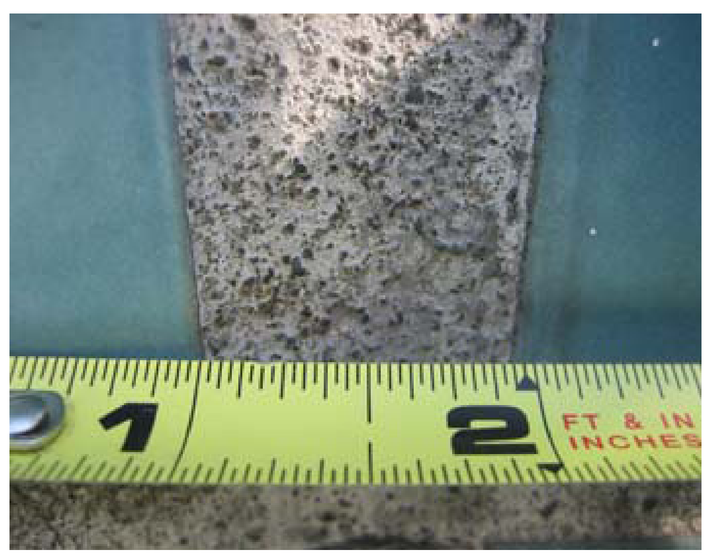
- Alignment - There appears to be a design intent to align window systems with the reveal pattern, however this alignment is irregular with some elements occurring at the reveal and others below the reveal. These conditions exist at most curtainwall/ribbon window locations.


Tiles cut to different widths to maintain alignment


Ribbon window head below reveal


Ribbon window sill aligned with reveal

Irregular grout joint size



Irregular grout joint size


Field tiles modified for a corner condition


Modified tiles at keystone with irregular joints/alignment

EXISTING BUILDING CONDITIONS

Portland Building under construction, circa 1981

Portland Building under construction, circa 1981

EXISTING BUILDING CONDITIONS

Significance of the Portland Building

One of the key factors to the significance of the Portland Building is that it was truly at the forefront of a movement. It became an icon of the Postmodernist style and was widely published as a "salient example" of this new architectural movement even before it was built. When it was finally completed in 1982, it became the first large scale realized example of Postmodernist architecture. As such, it manifested much of what Postmodernism sought to bring back to architecture including ideas of context, applied ornament and symbolism. The Portland Building immediately became the focus of a growing stylistic debate within the architectural community about the evolution of the modernist theories of design.

In addition to its importance to the postmodern movement, the Portland Building was a seminal project for architect Michael Graves. At the time of the Portland Building design competition, Graves was not particularly well known and had mostly completed smaller works and private residences. The Portland Building became Graves' first completed major project and brought his architectural practice to national attention. The building defined a style that would come to be recognized as uniquely Graves' and propelled his career to a new level. In the years since, Michael Graves and his firm completed multiple notable large building projects and achieved success in the field of product design as well.

Defining the Portland Building's "Character"

The Statement of Significance Summary for the Portland Building's National Register Nomination focuses on two elements: 1) its importance as an influential project for the Postmodern movement, and 2) its importance as a defining work in the career of architect Michael Graves. As such, it is not significant by character of workmanship or craft of the specific materials of which it is composed, but by the way that its composition conveys the theoretical ideas of a stylistic movement.

In terms of visual character, the dominant aspect of the Portland Building's design is expressed by its form and color. The National Register nomination notes key elements of the design as being "the bold and symbolic color, well-defined volumes, and stylized- and reinterpreted- classical elements." The diagram to the right shows that if one reduces the building to its basic geometric shapes and colors palette, the result is an image that is instantly recognizable as the Portland Building. It is a building that is defined much less by the fine layer of details as the bold, sweeping design gestures.

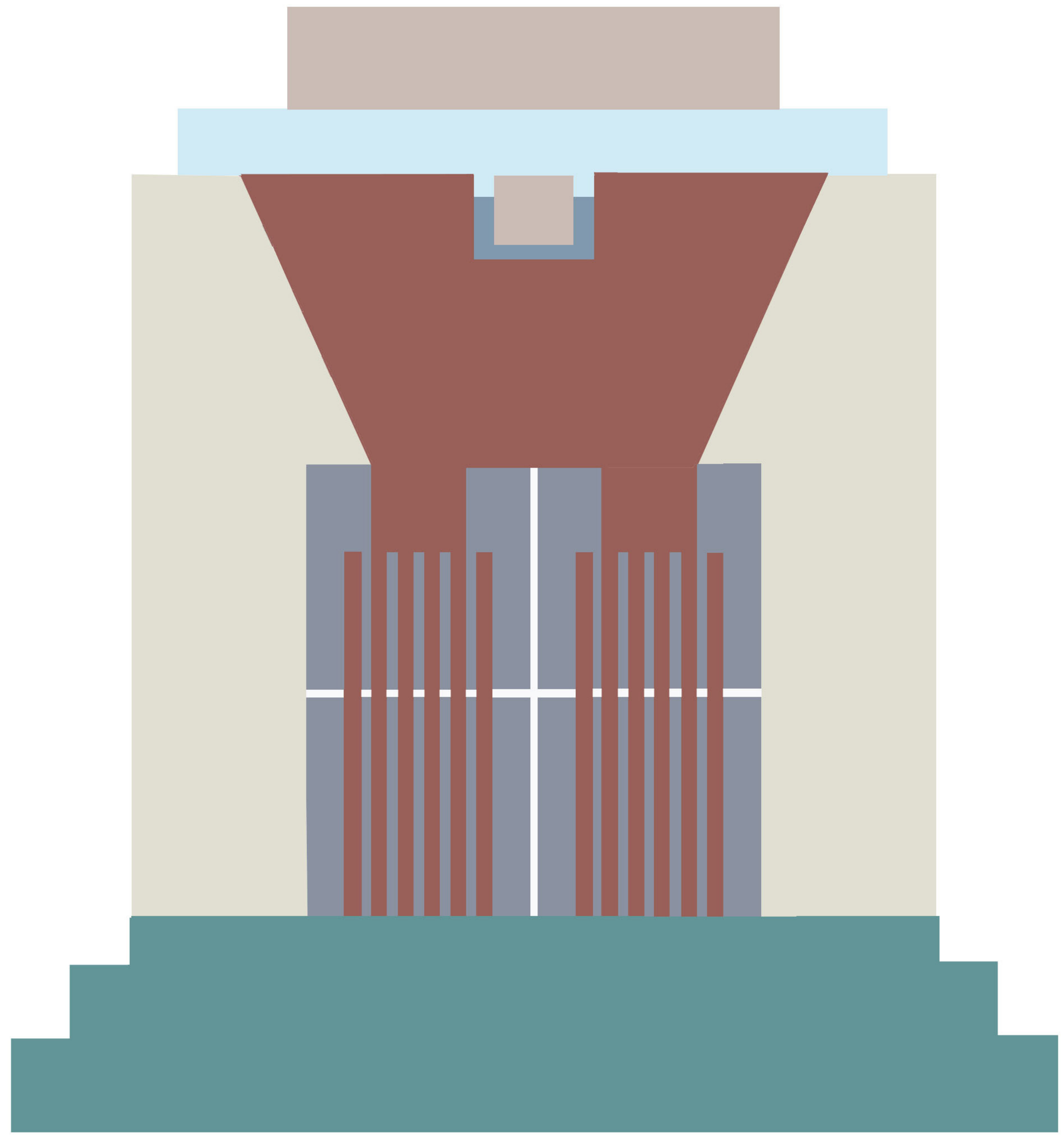


Diagram - The Portland Building Reduced to Basic Form and Color

"The first major-scale work of Graves' to be translated from paper to reality, the Portland Building was an architectural experiment in the supremacy of surface over form, paint over material, vocabulary over construction."[1]

The Portland Building's visual significance is largely tied to the ways in which it embodies many of the principles of Postmodernism. The use of reinterpreted classical elements, its response to site context, and the deep and layered use of symbolism put into physical form many of the ideas about Postmodernism that had previously been confined to theory. Graves' use of items like the keystone shapes, column elements and oversized capitals speaks to the language of traditional civic buildings. Their large scale and simple geometric nature, however, give them a decidedly modern flair. The building uses ornament and color as both a way to impart visual interest to the design and to be symbolic. Elements such as the garlands and Portlandia's outstretched hand are used to represent ideas of welcome. The Portland Building makes great efforts to be contextual and responsive to its site. The thin red column elements that pick up similar colored columns on the portico of the adjacent City Hall building and the reflective quality of the glazing that reflects the cityscape help the Portland Building relate to its surroundings.

Ultimately, Postmodern architecture was a movement that sought to make buildings relate to people. The Portland Building represents a building that was intended to be of and for the City of Portland. Perhaps best said by Vincent Scully,

"...his building takes its place perfectly in Portland's solid grid between the river and the hills. By any reasonable definition of the term, it is an entirely modern building, finding new "objective correlatives" for every one of the great, traditional shapes which it employs, and reproducing none of them. Because of that it should be taken as a major and highly creative step toward the salvation of our cities from the mindless junk with which they have recently been strewn. It enhances the meaning and enlarges the emotional scope of the office building program, and as such it touches the very heart of the city, the place where we work. But it belongs to town government most of all and is a monument to the principle of civic pride."[2]

[1] Bosker, Gideon and Lencek, Lena. Frozen Music: A History of Portland Architecture. Portland, 1985
[2] Scully, Vincent. "Michael Graves' Allusive Architecture", New York, 1982

PORTLAND BUILDING AS POST MODERNIST ICON

Postmodern Architecture

Postmodernism is a style that had an important influence in shaping the path of architecture despite its often polarizing aesthetic. The preceding modernist movement was characterized by pure, functional structures devoid of unnecessary ornamentation. A reaction against the neoclassical styles of the 19th century, modernism was fascinated by technology and the machine age and rejected references to classical styles and detail. The resulting buildings were often monumental structures seen by some as brutal and austere. As modernist architecture grew in popularity, a growing number of architects became disillusioned with the style. These designers saw modernist buildings as machines with no relation to the people dwelling within or to the context surrounding them.

Postmodernism developed as a rejection of the rigid tenets of modernism, and sought to restore humanity to architecture. Postmodernist architects embraced the integration of ornamentation and symbolism back into buildings. Traditional architectural building elements such as columns, porticos, and gables were reintroduced and often reinterpreted in oversized scales and bold colors. Postmodernism revived classic organizational techniques as well, such as the division of building facades into distinct base, shaft and capital features. The use of representational symbolism was also a key element of the style and was used as a way to connect postmodern buildings to their surroundings. Postmodern architecture was not afraid to be ornamental, referential, incongruous and even whimsical.

Vanna Venturi House, 1964 - Robert Venturi

Key Elements of Postmodernism

- Heavily referential to history and context
- Use of classical organization and features
- Use of ornamentation and symbolism
- Use of reinterpreted classical or historical features, often oversized
- Use of color and stylized forms

AT&T Building, 1984 - Philip Johnson

Piazza D'Italia, New Orleans, 1978 - Charles Moore

Harold Washington Library, 1991 - Hammond, Beeby and Babka

Swan and Dolphin Hotels, 1990 - Michael Graves

POSTMODERN ARCHITECTURE

How have other buildings dealt with similar issues?

While the application of preservation standards to post-war architecture is still relatively new, there have been several examples of significant works of modern and postmodern architecture that have undergone extensive rehabilitations and replacement of failed materials and systems. These buildings all struggled with issues similar to the Portland Building in that they were originally constructed with early iterations of building systems (many of which had almost no track records) or had design flaws based on the industry's limited understanding of building envelope systems at the time.

The shift to modern era construction types and systems holds many challenges to the use of standard preservation methods and justifications. While preservation has traditionally endeavored to retain existing materials or replace "in kind," modern era buildings do not always facilitate those techniques. The nature of the materials and the ways that they are used is fundamentally different in modern architecture than in traditional buildings. Wayne Curtis wrote about these challenges in 2002 in an article for Preservation magazine[1]. In the article he notes "Traditional buildings age gracefully, acquiring patina through the years; patinas don't enhance modern structures." The article notes that traditional buildings are usually made of "robust" materials that are "forgiving" while modern construction consists of much more thin and delicate assemblies that "leave very little margin for error. And consequently when they need to be repaired, it requires substantial replacement of what had been there."

In addition to the challenges of avoiding material replacement, many modern buildings pose similar challenges to the notion of replacement "in kind". As the following studies show, the Portland Building is not alone in dealing with issues borne of inherent design flaws. Whether prompted by budget constraints or undeveloped technology or understanding of a certain material or system, sometimes the basic design proves untenable. The issues faced by these modern-era buildings will require an adjustment to how "character" is defined. For these buildings, the materials and workmanship become less critical to the architectural character than the building's expression of a larger idea.

[1] *Curtis, Wayne. "No Clear Solution." Preservation, September/October 2002, pp.46-51, 118.*

PRECEDENT STUDIES

BMA TOWER
Kansas City, MO

The BMA Tower is a modernist style office building in Kansas City, Missouri, designed by Bruce Graham of Skidmore, Owings & Merrill. Graham would go on to lead the design of two of the most famous skyscrapers in the United States, the John Hancock Center and the Willis Tower (formerly the Sears Tower). The BMA Tower was individually listed in the National Register of Historic Places in 2002 despite the fact that its original marble cladding had been replaced with neoparium glass panels.

Completed in 1963, the tower was created to be a clean expression of modernist ideas. With a grid representing floor slabs and columns, and a window wall set back from the edge, the design allowed the structure to be the dominant visual element. The simplicity of the stark black and white facade is noted in the National Register nomination form as exemplifying "the Modernist philosophy of architect Ludwig Mies van der Rohe that 'less is more'."

The expression of the floor slabs and columns was originally achieved with a cladding of 1 1/4" thick white marble panels. But by the mid-1980s, many of the original marble panels had developed issues. As a result of some panels falling off of the building, the building owners commissioned an investigation into the cladding problems. The investigation noted a variety of issues with the original marble panels including inconsistent material quality, insufficient thickness, and improper attachment method. After concluding that "the facade marble is structurally unsafe at this time," the design team began exploring options including re-cladding the entire building. Due to a variety of constraints and the limited understanding of marble as a high-rise cladding material, alternate materials were examined.

The selected replacement material was neoparium glass, a crystallized glass panel product from Japan that somewhat simulated the look of marble. These glass panels offered the strength and dimensional stability required for a high-rise building application while achieving a similar visual effect. In 1986, all of the original marble was removed and replaced with neoparium glass.

In 2002 the building was nominated and listed in the National Register of Historic Places. In the *Integrity Assessment* portion of the nomination form the justification reads:

"As described in National Register Bulletin 15, an assessment of integrity requires a clear understanding of three things: The ways in which a property is significant; those physical elements that define its significance; and the integrity retained by these elements. The BMA Tower is significant for its clear expression of the tenets of architectural Modernism expressed by Ludwig Mies van der Rohe, and as a rare example of Modern Movement architecture in Kansas City. Therefore, in evaluating the integrity of the BMA Tower emphasis must be placed on the areas of ***Design, Setting, Feeling*** *and* ***Association****."*

The character of the BMA Tower is further explained as truly defined by the simplicity, symmetry and formal arrangement. The nomination goes on to state that "None of the changes to the building's materials, described above, impede the viewer's understanding of the original design."

ARONOFF CENTER FOR DESIGN
University of Cincinnati
Cincinnati, OH

The Aronoff Center is a unique Postmodern-style building that connects three previously separate structures occupied by the University of Cincinnati's College of Design, Architecture, Art and Planning. A campus landmark designed by noted architect Peter Eisenman, it was one of the first in a series of buildings by marquee architects intended to attract national attention for the University. A daring departure from its 1950s international style predecessors, the Aronoff is defined by its bold geometry and bright colored panels.

Completed in 1996, the building was originally clad with an adhered exterior insulation finish system (EIFS) which was chosen as a substantial cost savings over the tile cladding that Eisenman envisioned. Within a few years of its completion, the building was dealing with water infiltration issues at transitions and openings and the EIFS panels began to delaminate from the supporting structure. Various attempts to repair the system were unsuccessful and a mere 14 years after its completion, the university undertook a full replacement of the enclosure. In 2010, a new pressure equalized open joint rainscreen system with painted aluminum panels was installed over a weather barrier that replicated the original EIFS cladding. This system provided the building with a new facade that preserved the original appearance and created a building that will stand the test of time.

STANDARD OIL BUILDING
Chicago, IL

An influential work by noted modernist architect Edward Durell Stone, the Standard Oil Building was the tallest building in Chicago at the time of its completion in 1974. It was originally clad entirely in thin Italian Carrara marble panels. This material failed to resist thermal and wind pressures, and by the mid-1980s many of the marble panels had deformed and cracked. A short-term stabilization effort was undertaken using steel straps to ensure the panels would not fall off of the structure while the owner looked for a more permanent solution.

In the early 1990s, the entire building cladding was replaced with Mount Airy white granite, which is a stronger, more durable material. In addition to the change in material, the thickness of the panels was increased from 1 1/4" thick to 2" to provide the necessary stability to perform properly.

LEVER HOUSE
New York, NY

Listed in the National Register of Historic Places in 1983, the Lever House is a pioneer of early curtainwall skyscraper design. Designed by influential architect Gordon Bunshaft of Skidmore, Owings & Merrill, the building was instantly hailed as a wonder of modern American architecture.

Framed in carbon steel and relying only on sealants to keep out moisture, the 1952 structure quickly began experiencing problems. Moisture infiltration rapidly attacked the corrodible steel framing and expanding oxidation began cracking the glazing panels one by one. Piecemeal replacements left a building that looked more like a "patchwork quilt" than the pure gleaming tower it was intended to be.

By the late 1990s the building ownership started looking for solutions to save the building. As the existing steel framing was beyond repair and the use of carbon steel in the replacement would have been susceptible to the same failures in the future, a new skin of modern curtainwall framing and glazing was selected. Completed in 2002, the re-cladding project was hailed as a successful preservation effort and received an award from the New York City Landmarks Conservancy for restoring the original design.

UN SECRETARIAT BUILDING
New York, NY

Designed by a team of master architects including Le Corbusier and Oscar Niemeyer, the Secretariat is the hallmark building of the UN complex. Completed in 1952, it is one of the first glass curtain wall high rise buildings in New York City.

The building was challenged with performance issues soon after occupancy due to the intense solar heat gain through the single pane glazing. In order to alleviate this, a reflective film was added. Unfortunately, the film did not perform well and in many areas added thermal stress that caused the glass to crack.

In 2012, a full replacement of the existing curtain wall assembly was undertaken. The existing glazing and framing was replaced with a new thermally broken double glazed unitized curtain wall system that replicated the mullion layouts, but altered the internal configuration to solve the original performance issues.

CROWN HALL
Illinois Institute of Technology
Chicago IL

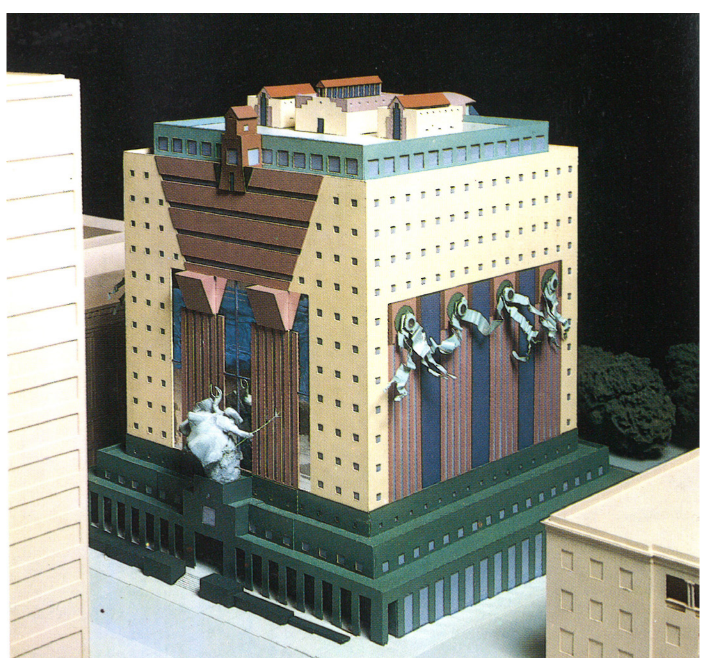
Listed in the National Register of Historic Places in 2001, Crown Hall is considered to be on of Mies van der Rohe's greatest examples of modern architecture and the "crown jewel" of the IIT Campus. The simple facade structure is composed entirely of glass and steel and is a testament to the purity of modernist design.

Completed in 1956, Crown Hall utilized construction methods that were revolutionary in their simplicity. The steel structure that supports the building is entirely exposed both inside and out protected by only a coat of paint.

Over the years, the building began to show the effects of the harsh Chicago climate. Condensation issues, due to the conductivity of the steel and exacerbated by the use of salt in the wintertime to melt ice and snow, had caused substantial corrosion to the steel frame and especially the glazing stops. Temperature fluctuations in the frames and strong Chicago winds had also cracked many of the original glazing panels resulting in piecemeal replacements.

By 2005, the stark steel and glass structure was in dire need of repair. At this time, IIT began a full renovation project that replaced all of the building's glazing and stops in addition to reconstruction of the south porch. Due to the fact that the glazing system for this building composed the majority of the exterior envelope, the project was in essence a full facade replacement. The glass was replaced with modern glazing that is stronger than the original annealed glazing and, due to new innovations in glazing, was able to be tempered and sandblasted to provide the translucence that was key to the original design.

PRECEDENT STUDIES



PROJECT OVERVIEW

Project Vision Statement

Provide a resilient building that serves community and workplace needs for current and future City operations for years to come.

Project Mission Statement

Reconstruct the Portland Building in a fiscally responsible way, creating a functional, accessible, sustainable, seismically upgraded workplace.

Project History and Business Need

The existing building has significant deficiencies including but not limited to: water intrusion, structural degradation, end-of-life mechanical and electrical systems, expensive operations and maintenance, and inadequate technology infrastructure. The building was also built prior to significant revisions to the building code in the 1990s that provided improved seismic performance criteria. Starting in 2012, multiple studies and assessments were completed addressing various fiscal and business scenarios that included: building a new City building or moving employees to another building within the downtown or east Portland area. It was ultimately determined that the best option was to invest in the current asset and reconstruct the Portland Building. This option demonstrates fiscal responsibility, preserves the existing government center in the downtown core, is appropriate for the business needs of the City employees, provides convenient access to the public and maintains a historically significant building.

On October 21, 2015, Portland City Council adopted a resolution directing the Office of Management and Finance to develop a Request for Proposals and solicit bids for the reconstruction of the Portland Building for an amount not to exceed $195 million for the design, relocation, reconstruction and project management and be complete by the end of 2020.

Project Principles

- Accessibility
- Cost Consciousness
- Historic Preservation
- Quality Workplaces
- Seismic Resiliency
- Sustainability

Project Requirements and Expectations

While this project initially began as a maintenance project, it has become evident that solving the building's issues will require an extensive scope of work. So much so, that it provides an opportunity to achieve goals beyond the bare necessities.

At a minimum, the project will do the following;

- Eliminate water intrusion issues
- Repair structural degradation and upgrade seismic performance to meet current code for existing buildings
- Upgrade/replace HVAC and other building systems that are at/near the end of their useful life
- Upgrade accessibility of the building

Additionally, the project scope provides an opportunity to:

- Preserve the historic integrity of the building
- Meet the City's goals for equity and inclusion as set forward in the Equity and Inclusion Plan for the project, as well as goals for DWMESB participation in consultation services
- Work with the Bureau of Planning and Sustainability to ensure that the City's Green Building Policy is appropriately applied to the project, including the expectation it will achieve a minimum certification of LEED Gold.
- Improve the quality of the workplace
- Improve the technology infrastructure to support current and future technology solutions.

The Project will also require moving and relocating staff to accommodate the construction work. The project will do this with the goal of minimizing disruptions of staff and services to customers.

Aspirational Goals and Anticipated Benefits

- Maintain the historic and iconic status of the building
- Incorporate current best practices in construction, design and technology to create a 21st century facility that meets community, business and operational needs
- Follow Universal Design practices
- Create a flexible and efficient building
- Demonstrate fiscal responsibility by using high quality and durable materials and systems
- Provide systems and materials that are economical to operate and maintain
- Balance remodel costs with the need to keep life-cycle costs low

Proposed Envelope Solution

In determining a solution for the Portland Building it is important to consider the following:

- The Portland Building suffers from envelope issues that are severe and inherent in its flawed construction detailing
- The current level of deterioration is beyond repair, and innovative technical solutions that truly address these issues are required to save the building
- The Portland Building is the workplace for over 1,300 City employees and needs to function properly for the people who use it

With these considerations in mind and after careful study of the existing enclosure, it has become clear to the design/build team that removing and replacing elements "in kind" will not remedy the problems with the Portland Building's envelope. The team has determined that the only viable way to provide a long-term remedy for the extensive and severe envelope failures is to add a new rainscreen enclosure system over the entirety of the existing façade. While previous reports and studies had already made this recommendation at the tile clad portions of the building, the project team determined that any scenario that attempts to integrate rainscreen systems with the concrete barrier wall will ultimately fail over time. The existing building's reliance on sealant between these wall types has proven to be an untenable condition and should not be repeated.

Because of the way that the building is detailed, screening the concrete to shed water, relieve wind pressure, and control temperature fluctuations is the only approach that will successfully prevent leaks, arrest deterioration, and provide a functional interior environment. This rainscreen system will provide the building with a protective layer that it desperately needs. Consequently, there is no need to demolish the existing materials as the new system could be installed over them as a reversible intervention. The proposed rainscreen system and materials have the ability to replicate the exterior enclosure appearance, planar relationships and joint patterns.

In some cases, the building's failed systems cannot be replaced with like materials. Similar to many of our precedent studies, there are issues that must be addressed where materials are not suitable for their intended applications or there are existing building limitations. In the case of the concrete, the existing building structure cannot bear the additional weight that pre-cast concrete panels would add, so the proposed replacement material is aluminum panel painted to match the existing painted concrete. Mortared ceramic tile systems do not perform well in the wet climate of the Pacific Northwest, so the proposed replacement material is mechanically fastened terracotta tile. What is most critical is that the proposed new glass, aluminum panels, and terracotta tile will be carefully detailed to maintain the existing look and feel of the building. By achieving these objectives, the rainscreen solution will preserve the design intent of the original exterior and protect an important and valuable resource for the City of Portland.

The rainscreen concept is the best possible enclosure remedy for The Portland Building, as it closes gaps in the barrier and shields air, water and thermal leak locations in the existing enclosure from exposure to weather. The new high-performance enclosure will protect the building and its occupants from the elements while significantly improving the energy performance of the building. The proposed system is comprised of panels, filled with insulation, that cover all surfaces. Pressure equalization engineered within the new system effectively diverts air and water away from joints so they remain dry, and thus cannot leak. This new insulative layer warms walls in winter and keeps them cool in summer, stabilizing interior surface temperatures so occupants are comfortable and mechanical performance is improved. It also serves to alleviate condensation, eliminate thermal bridges, and reduce energy loss.

A more detailed explanation of the technical benefits of the rainscreen solution as well as a brief summary of other systems and materials considered are included in Appendix A: Facade Forensics Enclosure Report.

The proposed changes do not compromise the integrity of the Portland Building's character. With materials and workmanship being less critical for this style of building, the new skin over the historic failed skin does not irrevocably harm the resource's integrity. As stated in the National Register nomination form, "The building's style was expressed through paint and applied ornament that implied classical architectural details..." In addition to continuing to communicate the building's form, diagrammatic areas of shape and color, and its ornament, the design for the reconstruction also captures smaller design components that affect integrity including relationship between parts and planes; reveals/shadow lines; sheen, texture, and reflectivity; material differentiation; and areas of increased design emphasis/material quality at the pedestrian level. All of these efforts preserve the form and integrity of the resource.

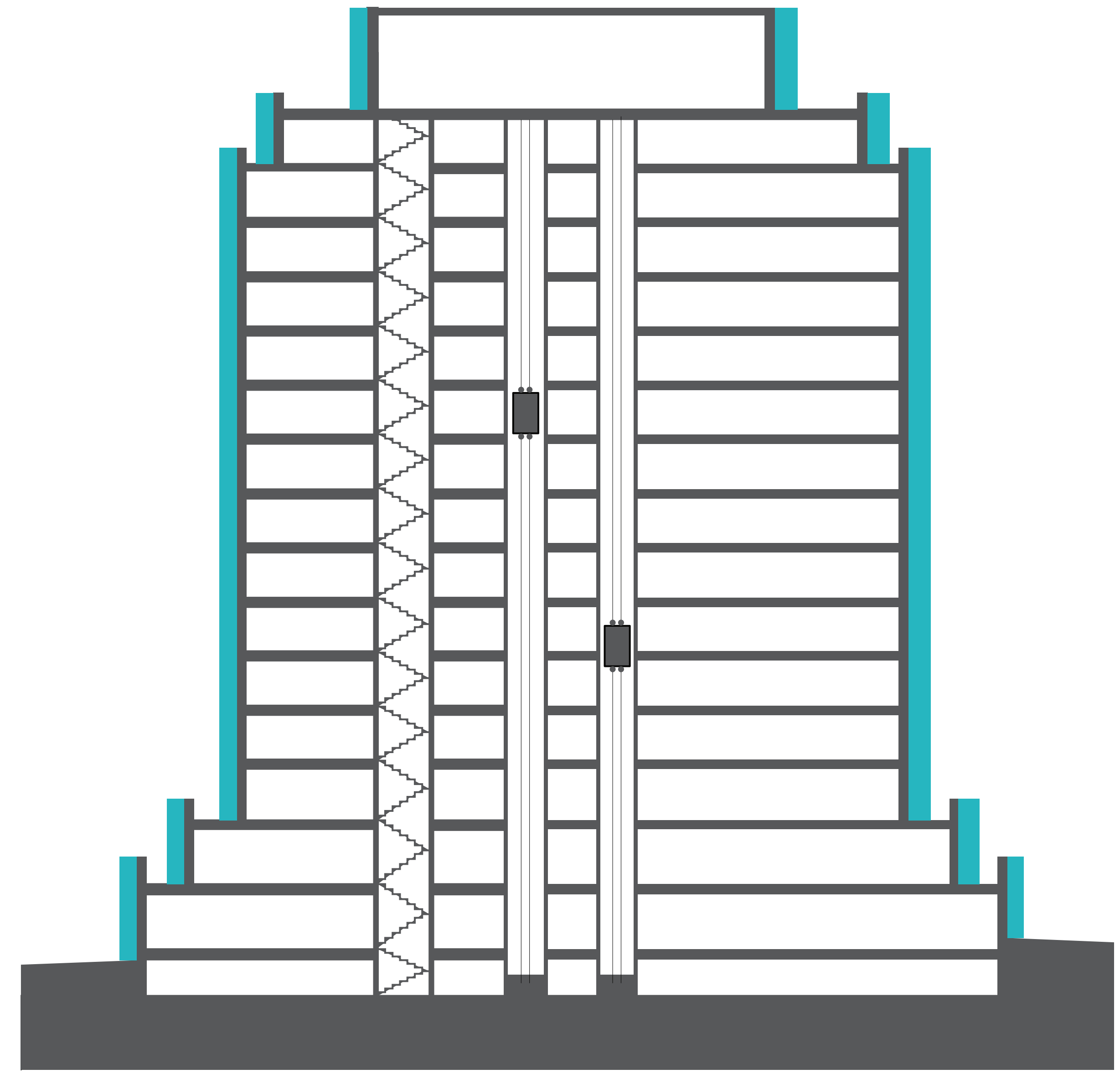
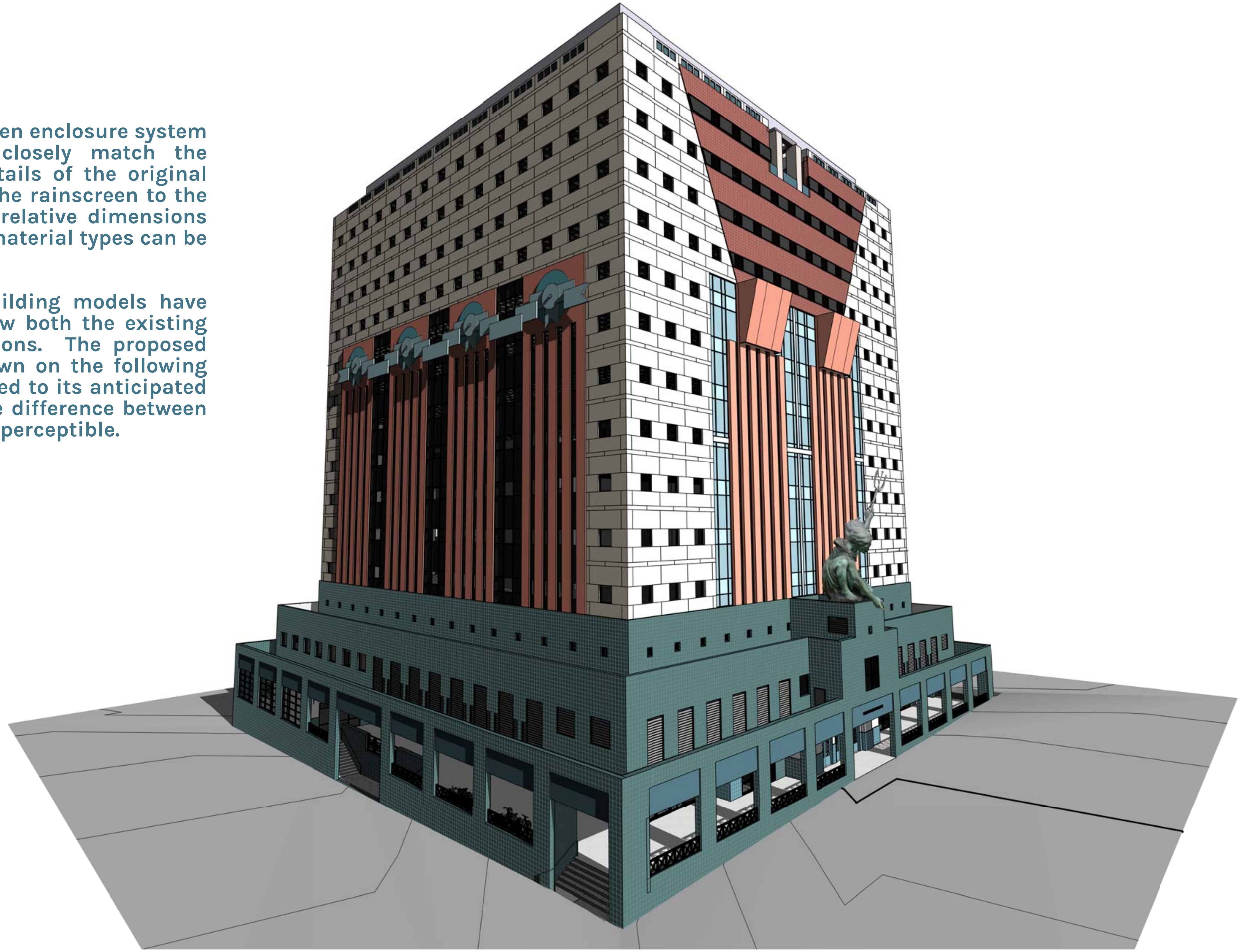


Diagram - New Pressure Equalized Rainscreen Enclosure System over Existing Building

PROPOSED ENVELOPE SOLUTION

The proposed rainscreen enclosure system has the ability to closely match the colors, forms and details of the original building. By adding the rainscreen to the entire enclosure, the relative dimensions between system and material types can be maintained.

The following two building models have been rendered to show both the existing and proposed conditions. The proposed cladding system, shown on the following page, has been modeled to its anticipated thickness and yet, the difference between the views is almost imperceptible.

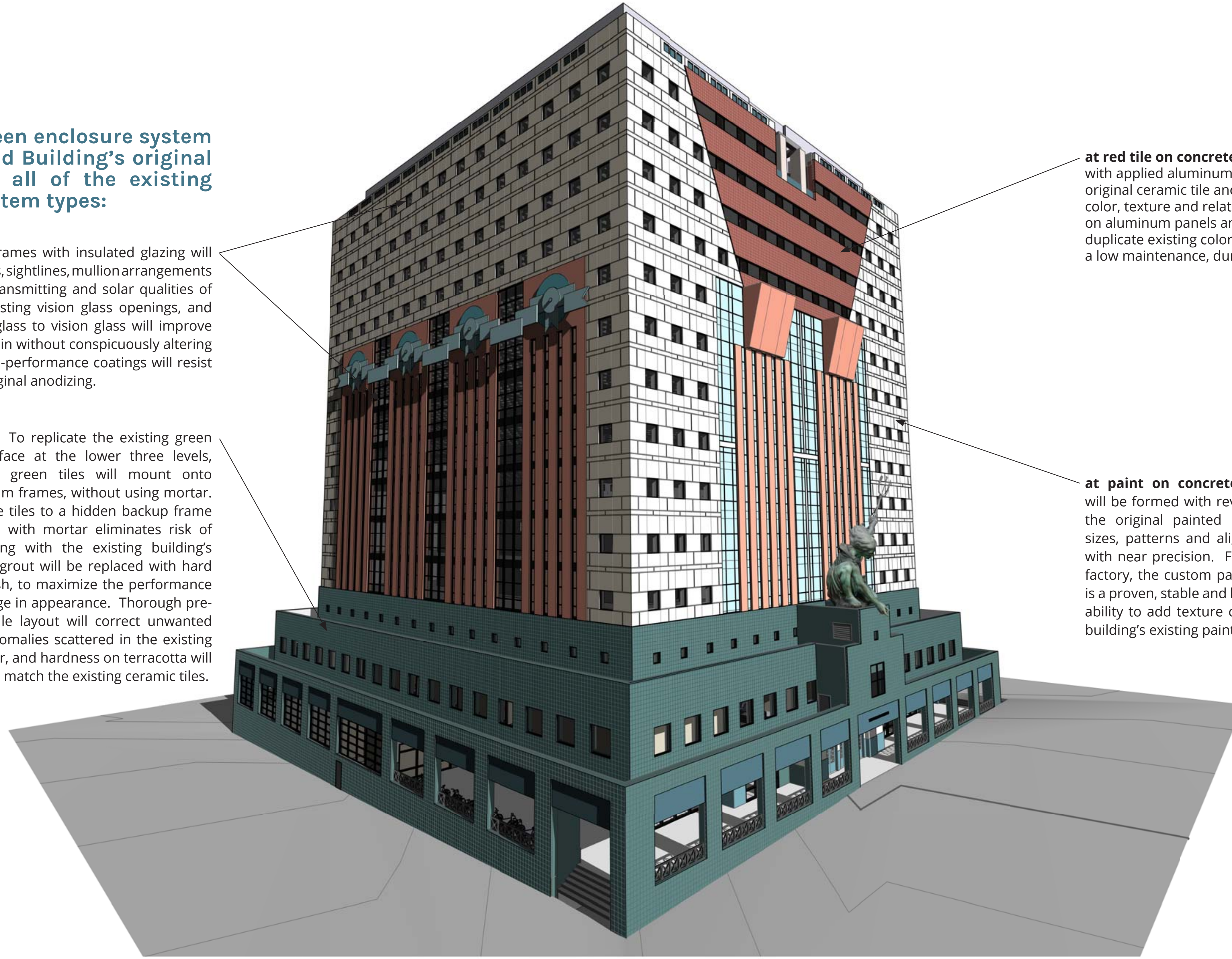


OVERALL BUILDING PERSPECTIVE - EXISTING

The proposed rainscreen enclosure system replicates The Portland Building's original exterior surfaces for all of the existing primary enclosure system types:

at openings: Aluminum frames with insulated glazing will replicate the original frames, sightlines, mullion arrangements and colors. Better light-transmitting and solar qualities of new glass, maximizing existing vision glass openings, and changing some spandrel glass to vision glass will improve daylighting and cut heat gain without conspicuously altering exterior appearance. High-performance coatings will resist weathering better than original anodizing.

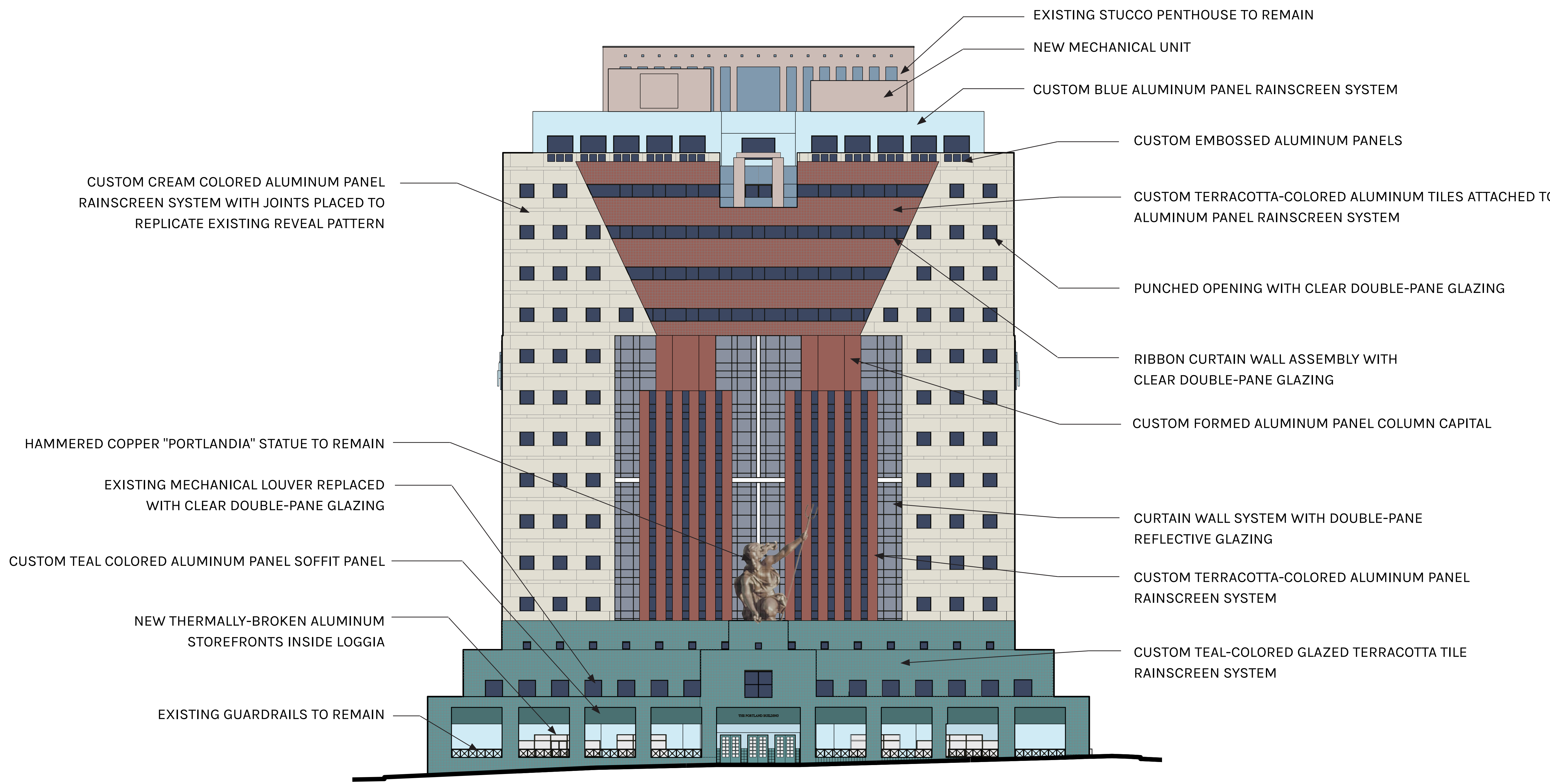
at teal tile on concrete: To replicate the existing green clay tile glazed hard surface at the lower three levels, new duplicate terracotta green tiles will mount onto concealed custom aluminum frames, without using mortar. Mechanically mounting the tiles to a hidden backup frame instead of adhering them with mortar eliminates risk of chronic problems occurring with the existing building's adhered tile veneer. The grout will be replaced with hard silicone and a sanded finish, to maximize the performance while minimizing the change in appearance. Thorough pre-engineering of the new tile layout will correct unwanted wide joints and cut tile anomalies scattered in the existing facade. Glaze texture, color, and hardness on terracotta will physically and aesthetically match the existing ceramic tiles.



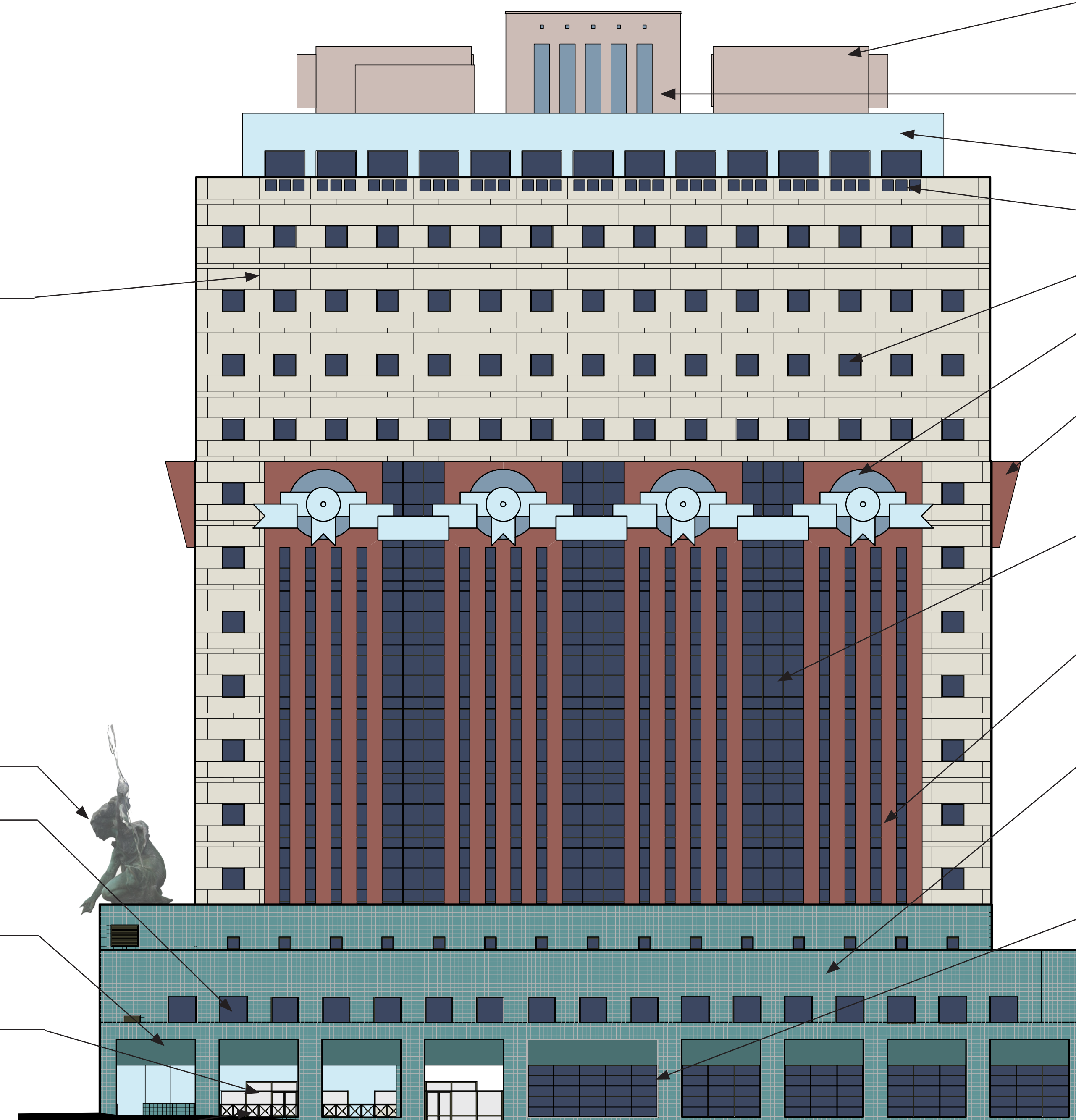
at red tile on concrete: Aluminum plate panels with applied aluminum red tiles will replicate the original ceramic tile and grout's original patterns, color, texture and relative scale. Kynar finishes on aluminum panels and aluminum tiles will duplicate existing color and sheen while providing a low maintenance, durable finish.

at paint on concrete: Aluminum plate panels will be formed with reveals and painted to match the original painted concrete surface. Reveal sizes, patterns and alignments will be replicated with near precision. Fabricated and finished in a factory, the custom panels' baked-on kynar finish is a proven, stable and low maintenance finish. The ability to add texture can assist in replicating the building's existing painted finish.

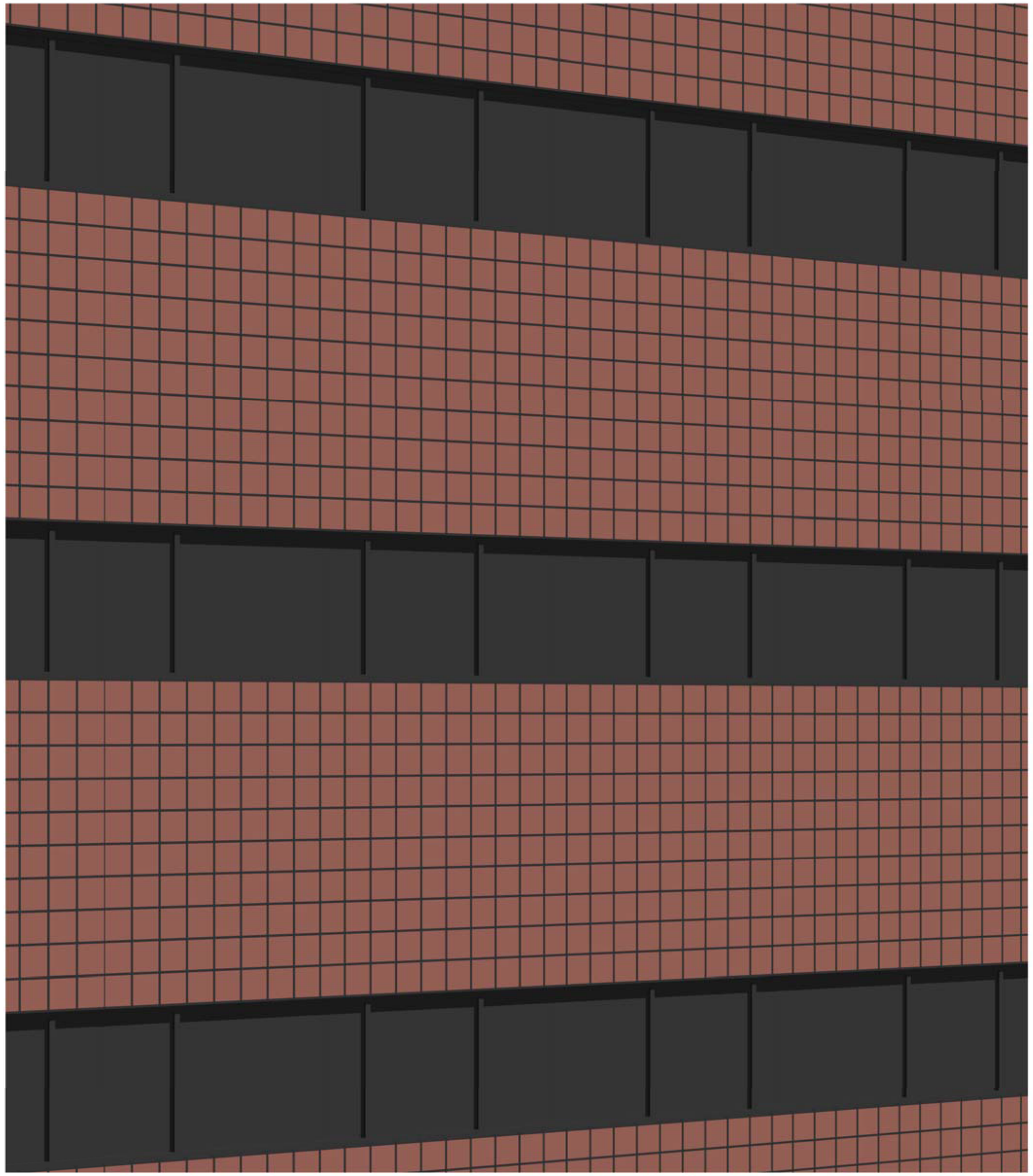
OVERALL BUILDING PERSPECTIVE - PROPOSED



PROPOSED ELEVATION MATERIALS - WEST (SIMILAR AT EAST)

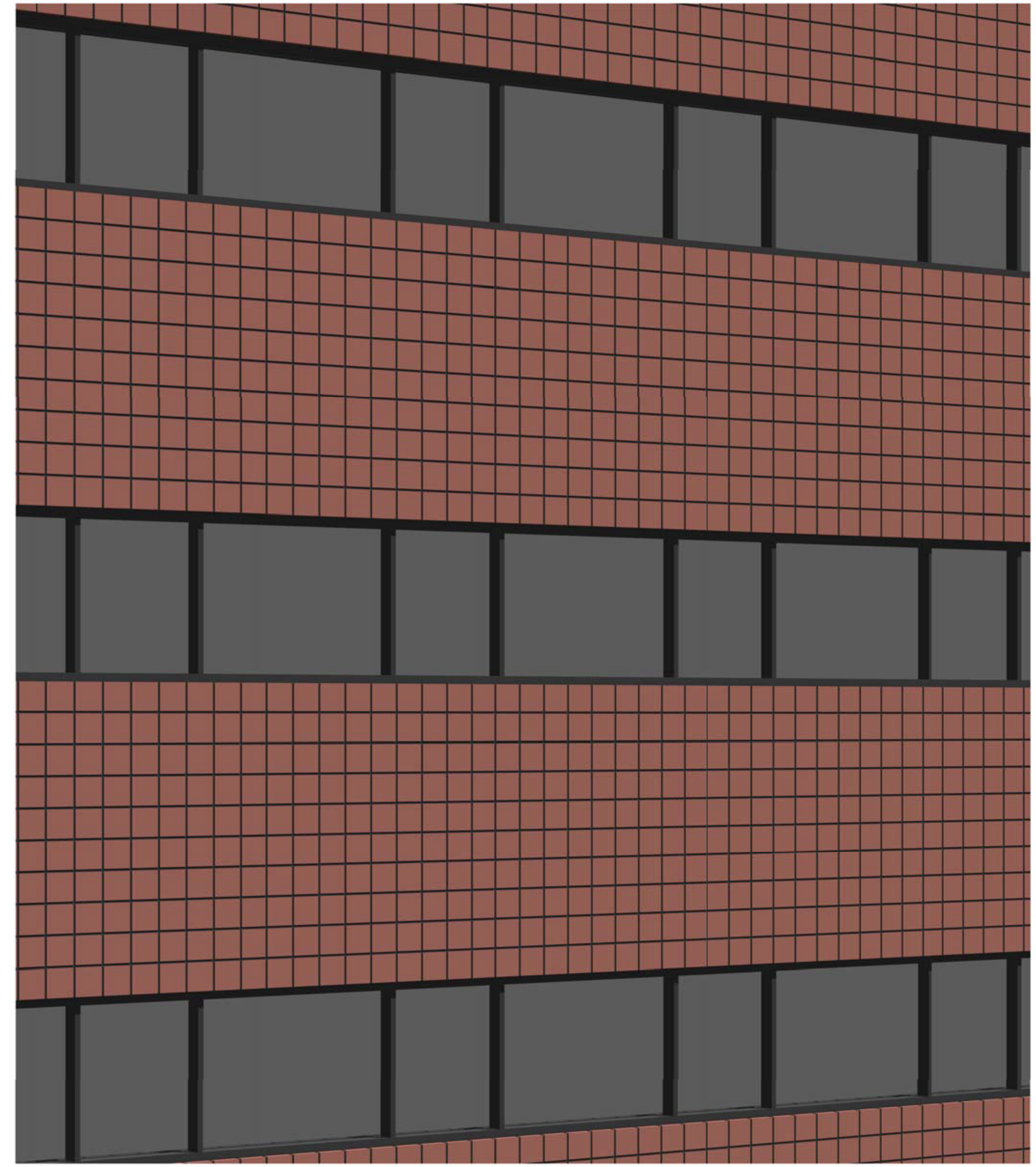


PROPOSED ELEVATION MATERIALS - SOUTH (SIMILAR AT NORTH)



DETAIL VIEW AT EXISTING RED TILE KEYSTONE

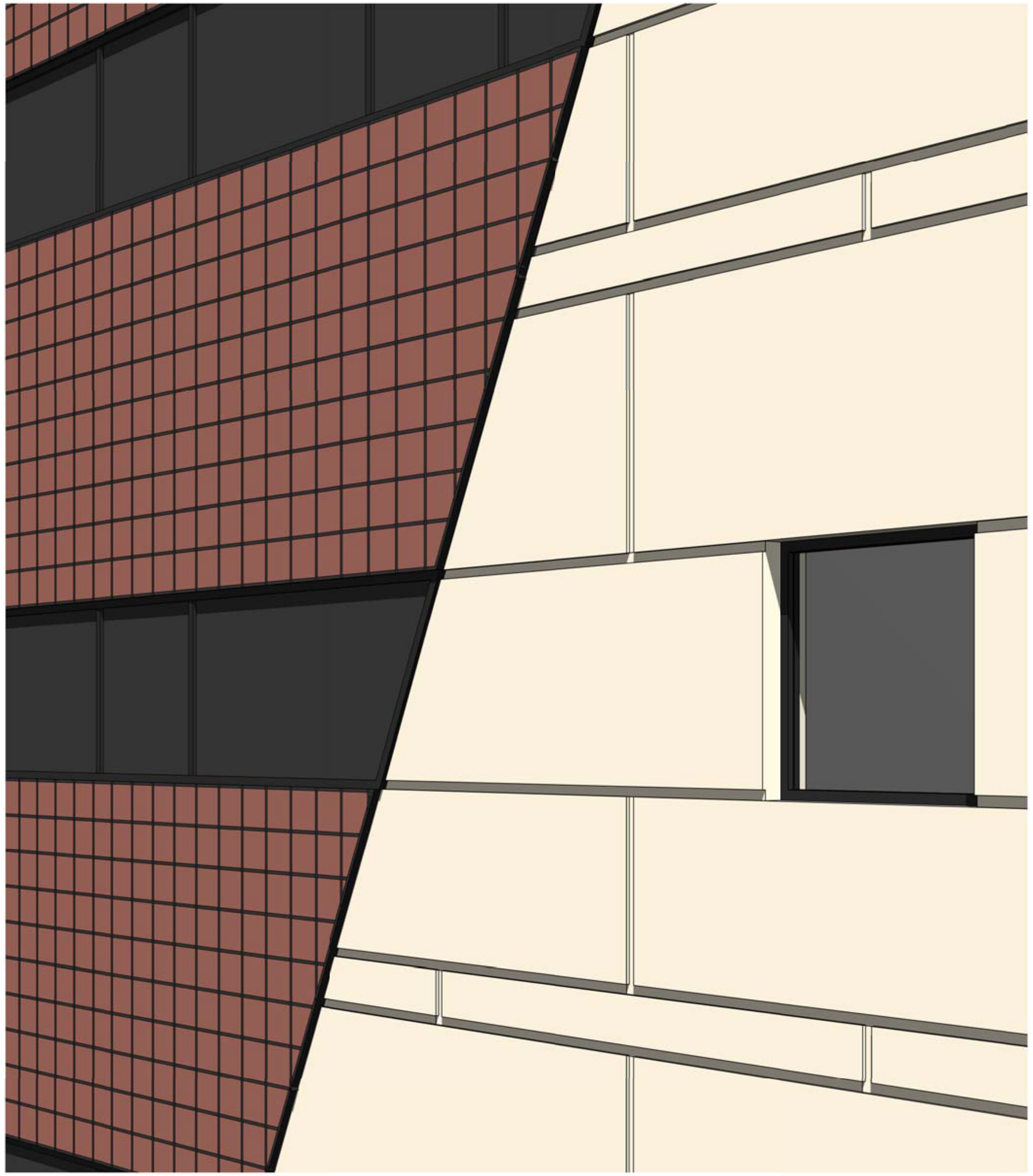
NOT TO SCALE



DETAIL VIEW AT PROPOSED RED TILE KEYSTONE

NOT TO SCALE

EXISTING/PROPOSED DETAIL COMPARISON



DETAIL VIEW AT EXISTING INTERSECTION OF TOWER AND RED TILE KEYSTONE

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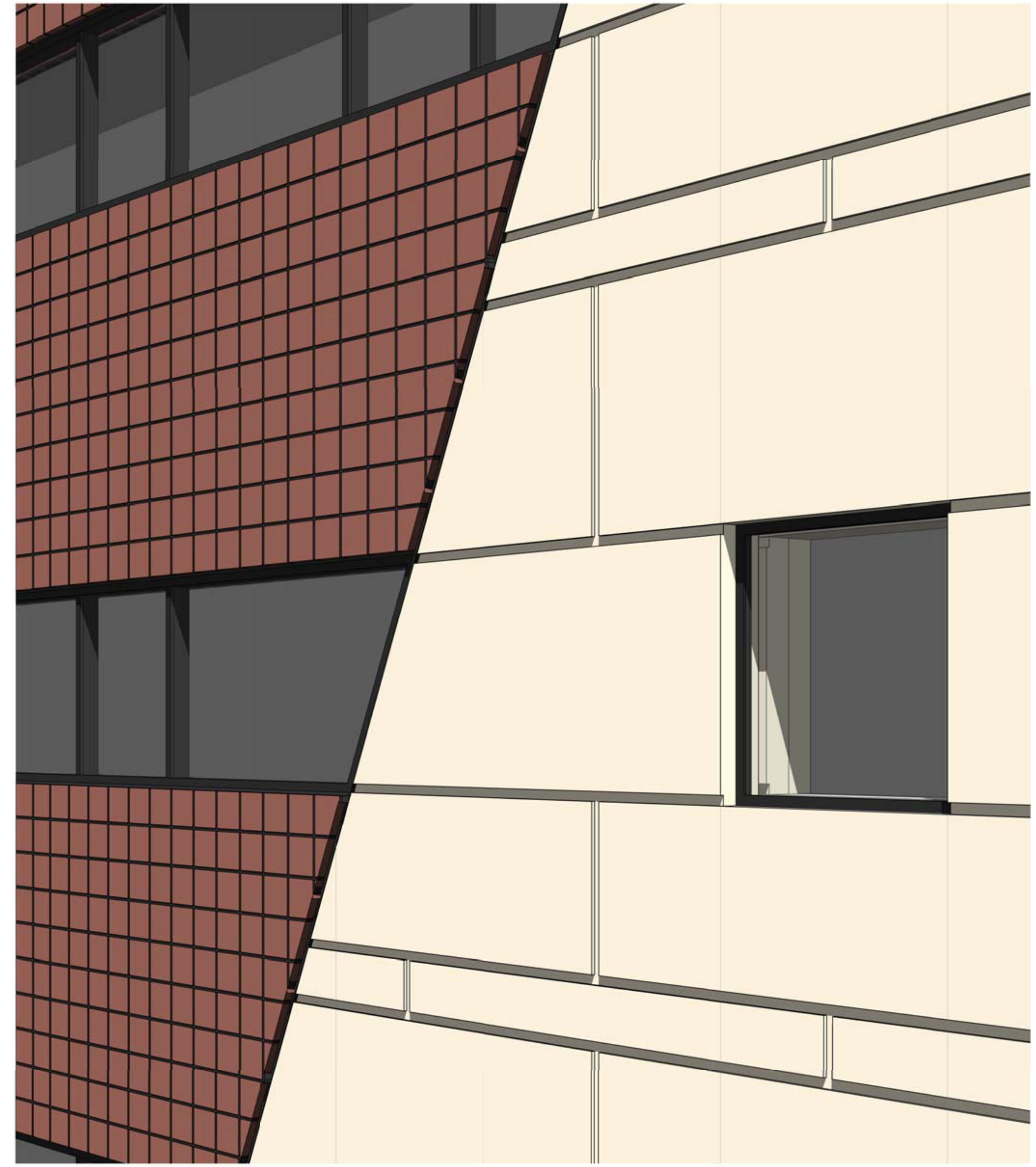
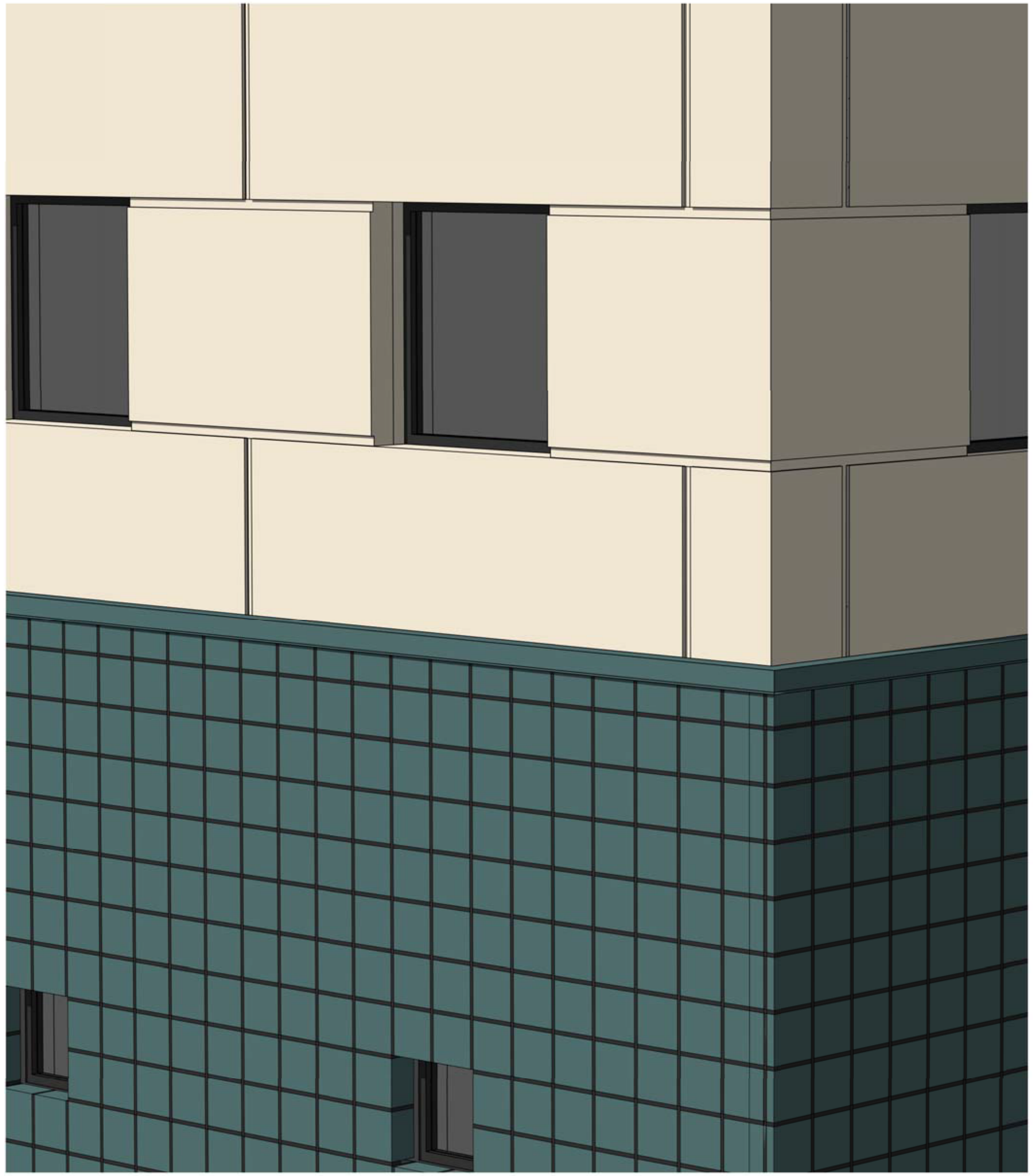


DETAIL VIEW AT PROPOSED INTERSECTION OF TOWER AND RED TILE KEYSTONE

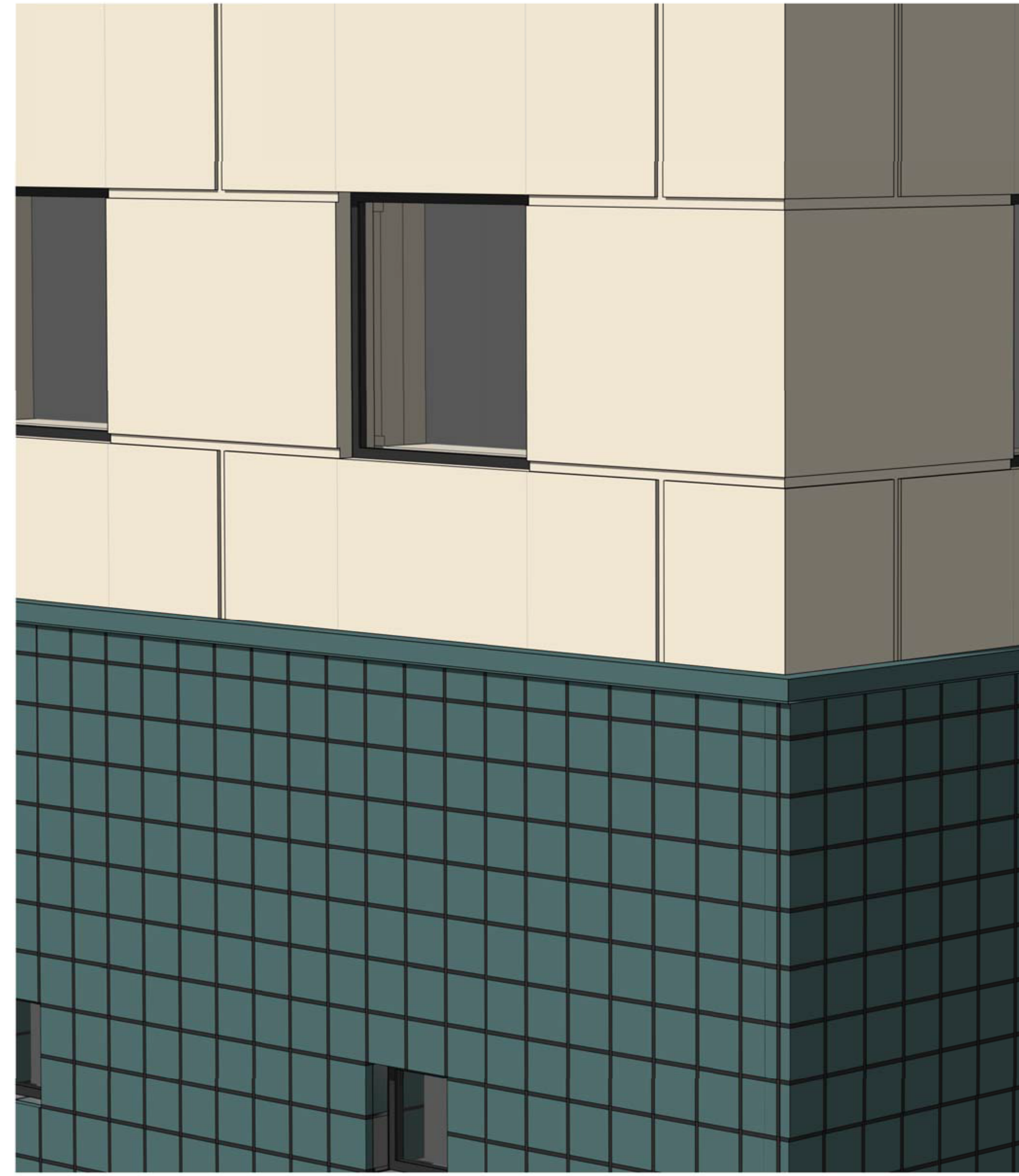
NOT TO SCALE

EXISTING/PROPOSED DETAIL COMPARISON



DETAIL VIEW AT EXISTING INTERSECTION OF TOWER AND TEAL TILE BASE

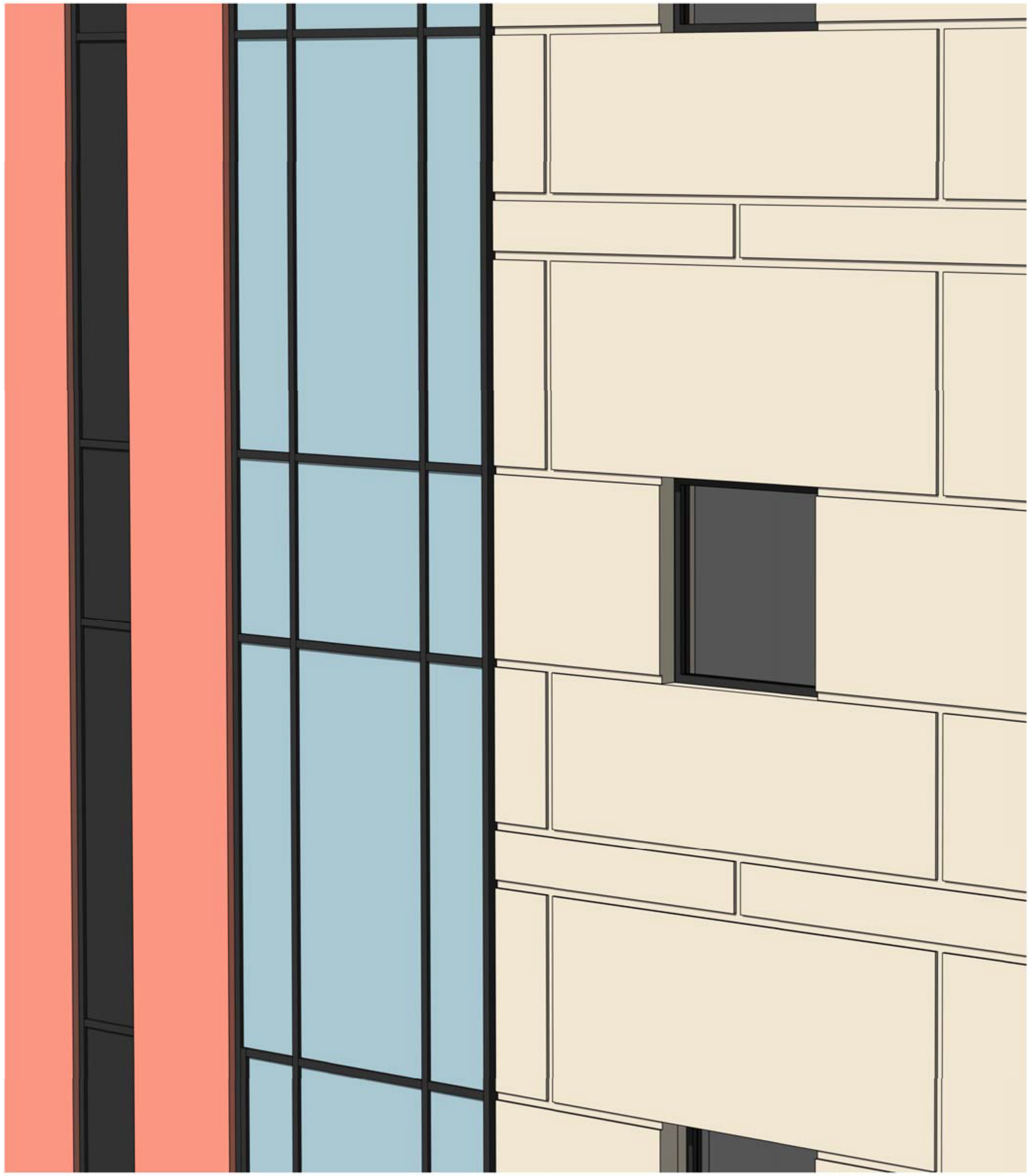
NOT TO SCALE



DETAIL VIEW AT PROPOSED INTERSECTION OF TOWER AND TEAL TILE BASE

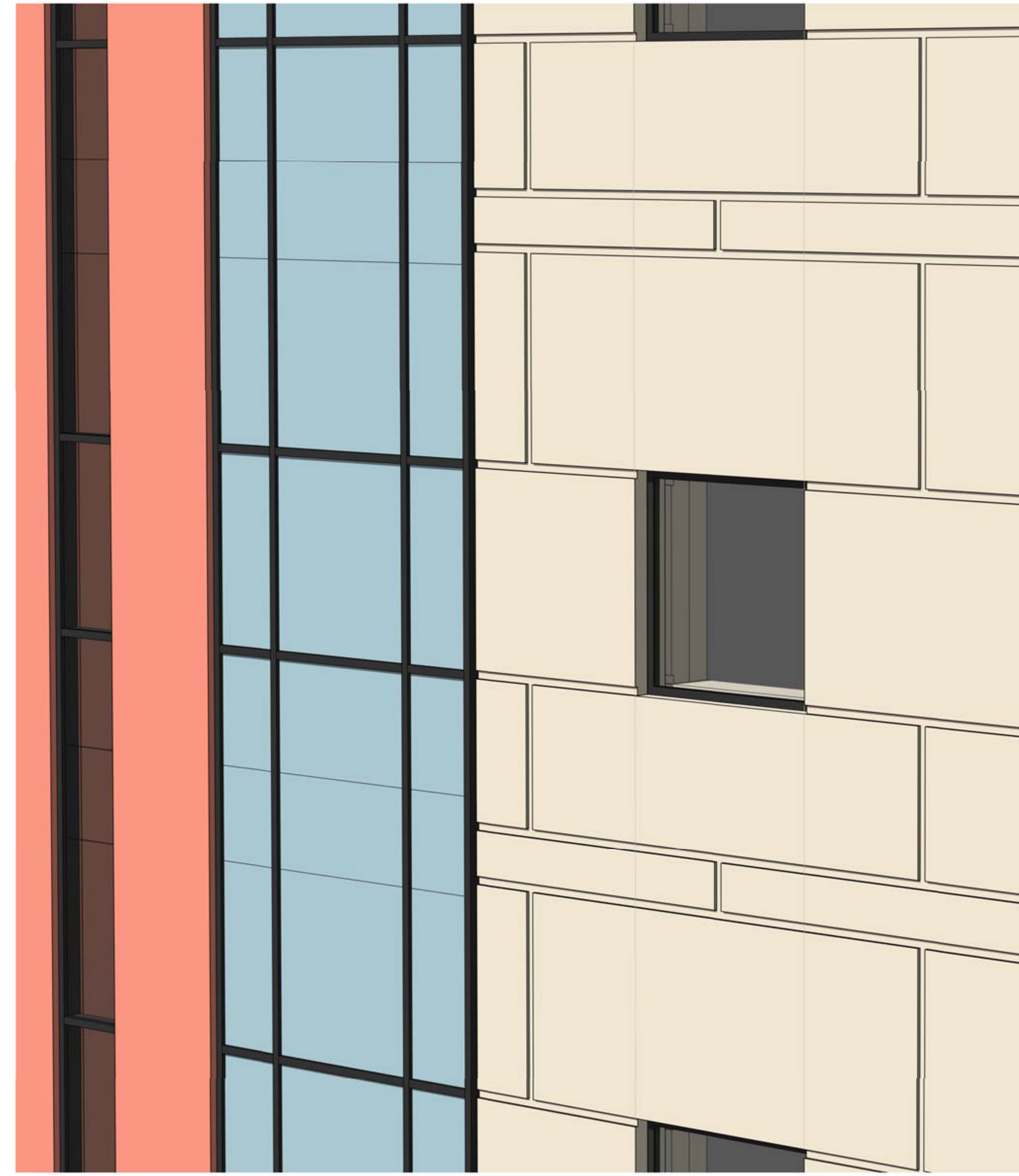
NOT TO SCALE

EXISTING/PROPOSED DETAIL COMPARISON



DETAIL VIEW AT EXISTING INTERSECTION OF TOWER AND GLAZED CURTAINWALL

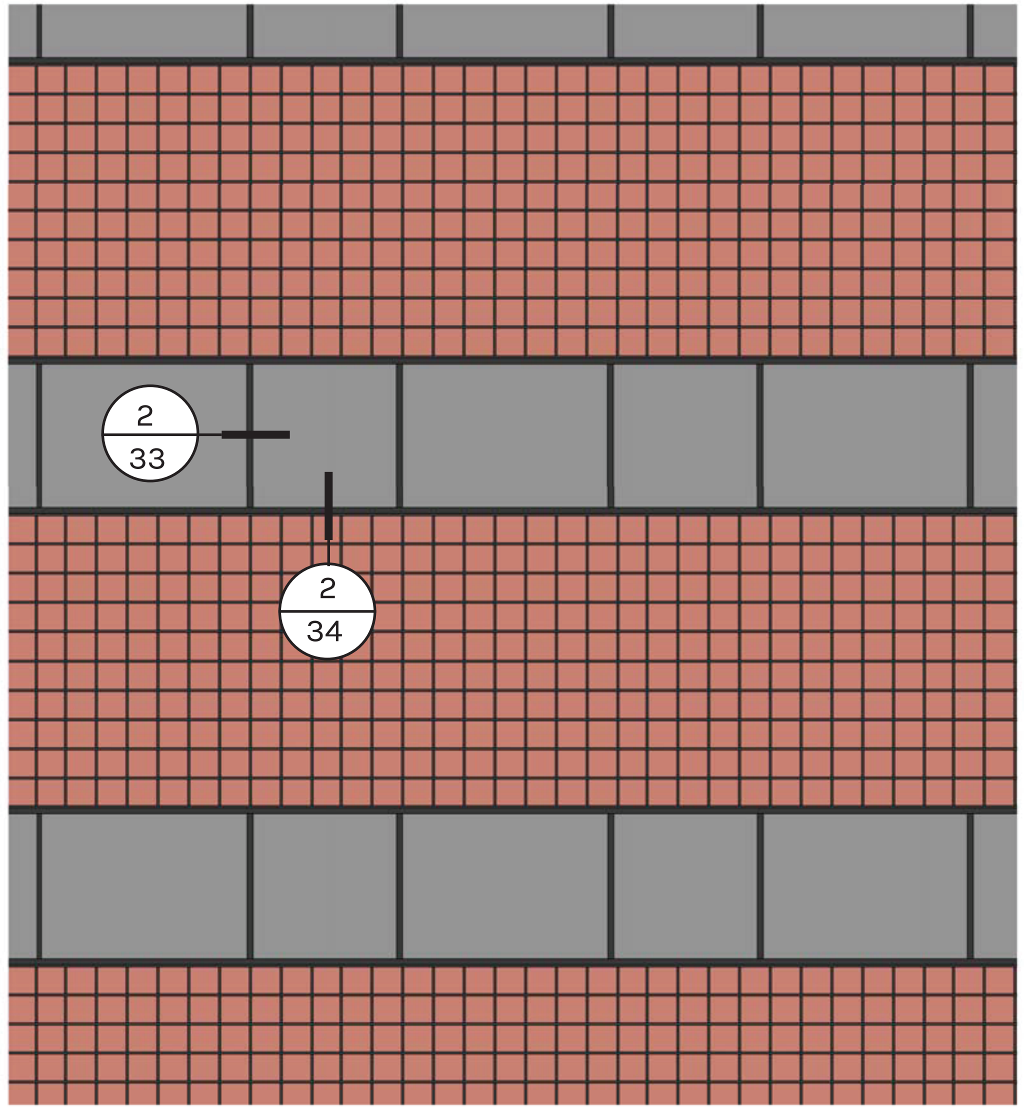
NOT TO SCALE



DETAIL VIEW AT PROPOSED INTERSECTION OF TOWER AND GLAZED CURTAINWALL

NOT TO SCALE

EXISTING/PROPOSED DETAIL COMPARISON



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32
TYPICAL ELEVATION AT RED TILE KEYSTONE

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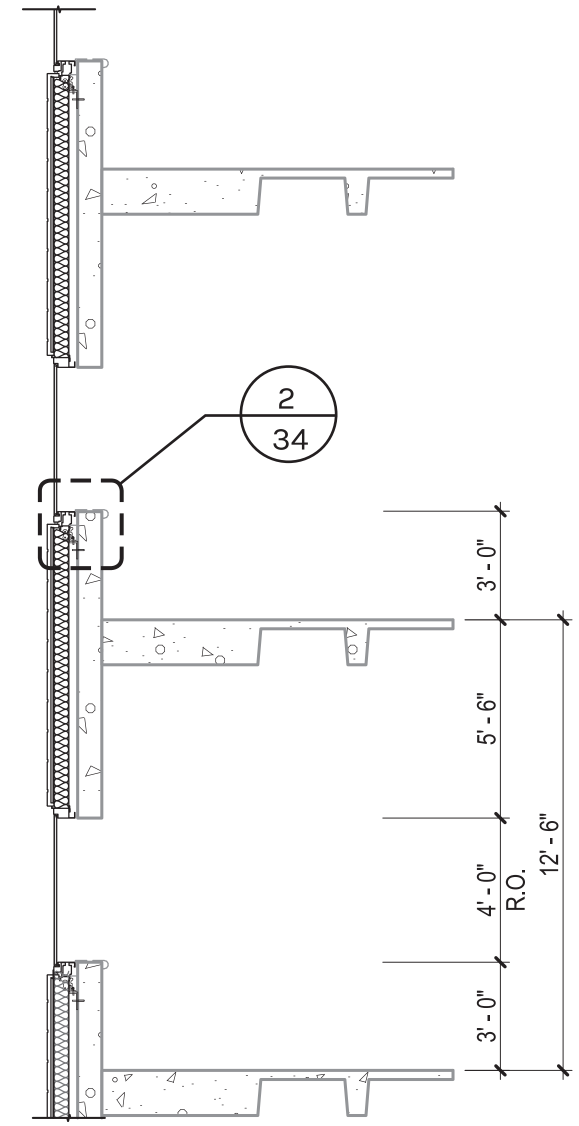

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PARTIAL SECTION AT RED TILE KEYSTONE

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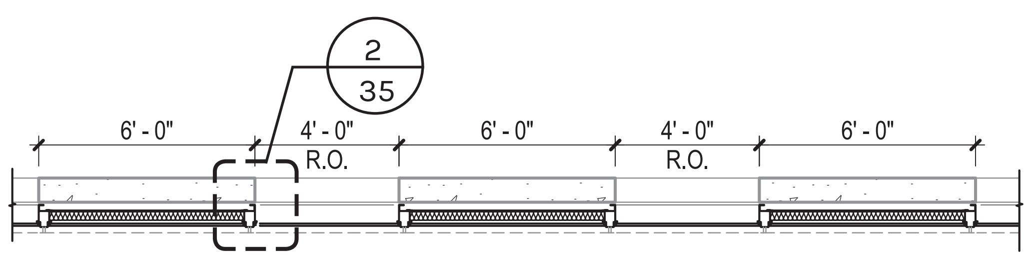

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PARTIAL PLAN AT RIBBON WINDOWS

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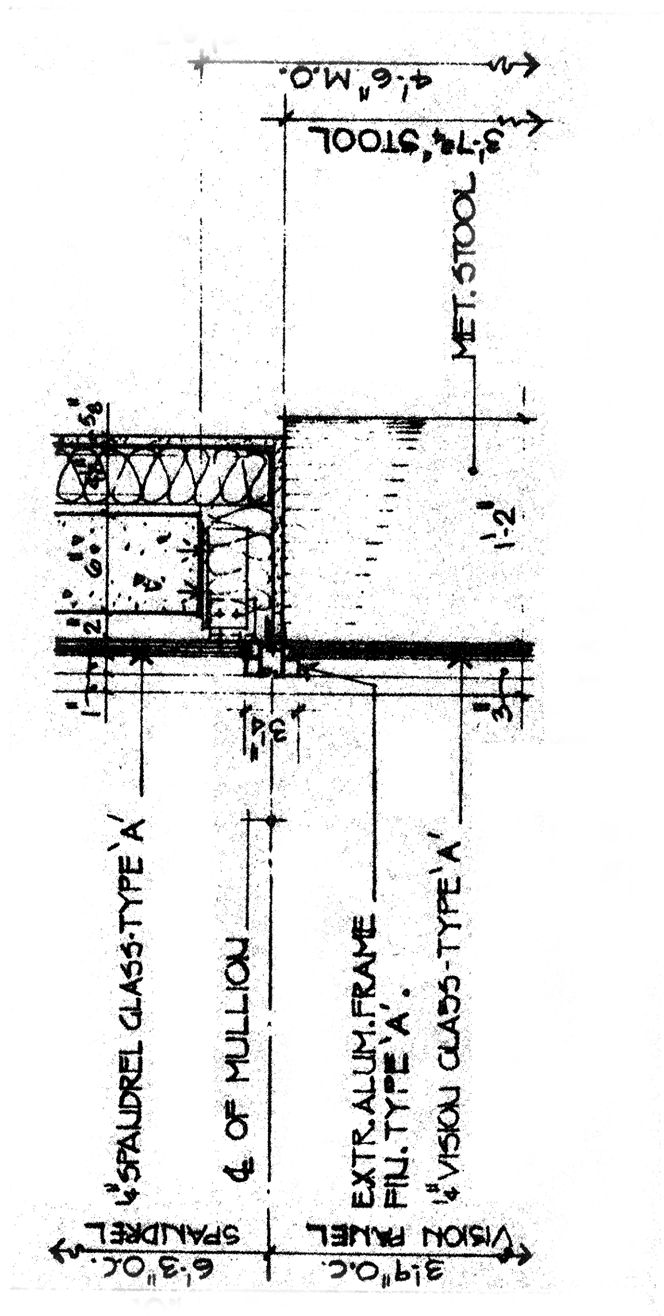
PROPOSED FACADE DETAILS



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EXISTING JAMB DETAIL AT RIBBON WINDOW
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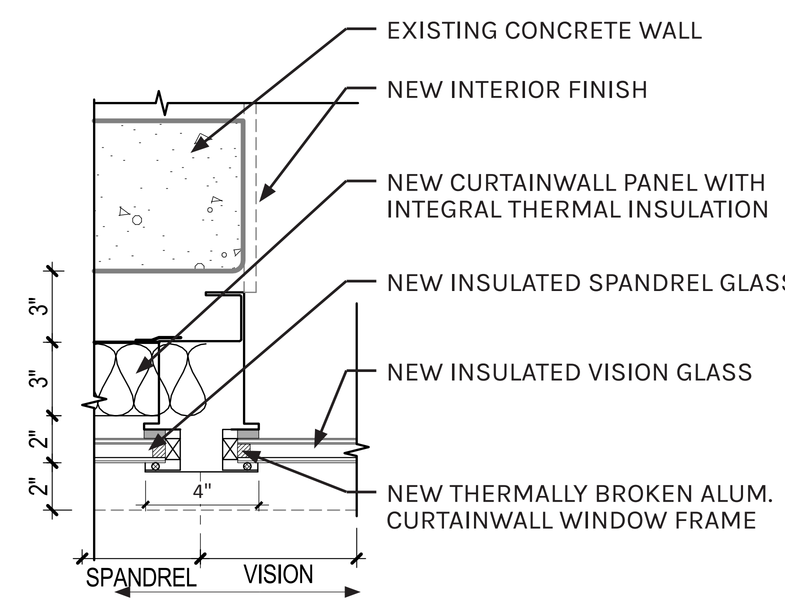

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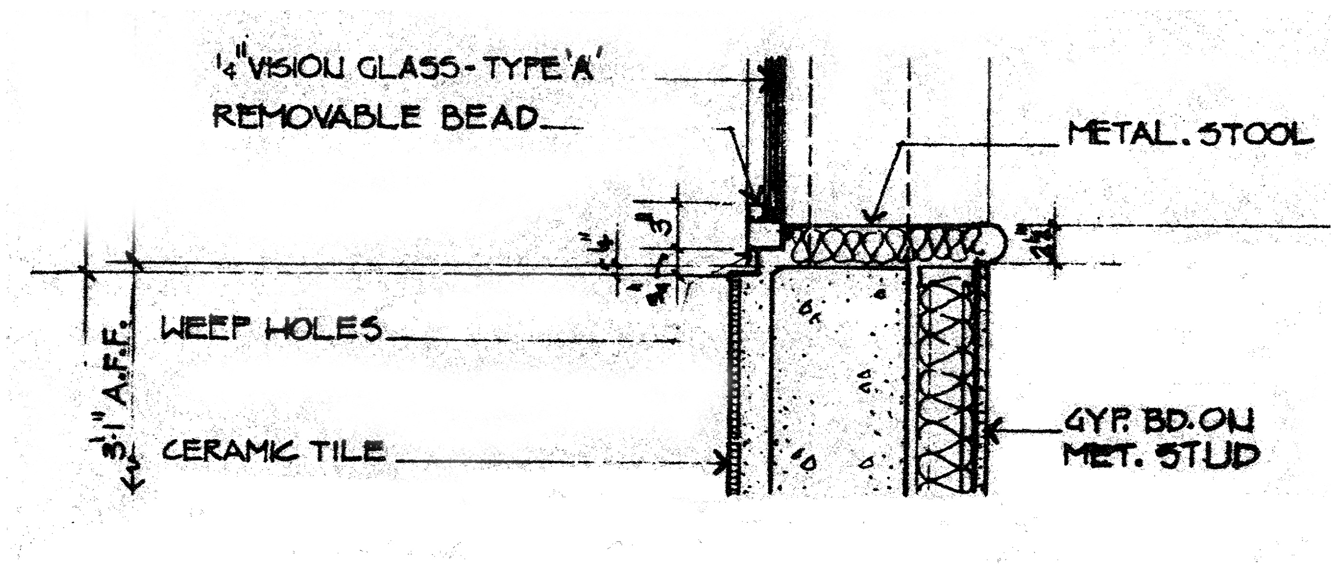
PROPOSED JAMB DETAIL AT RIBBON WINDOW
NOT TO SCALE

PROPOSED FACADE DETAILS



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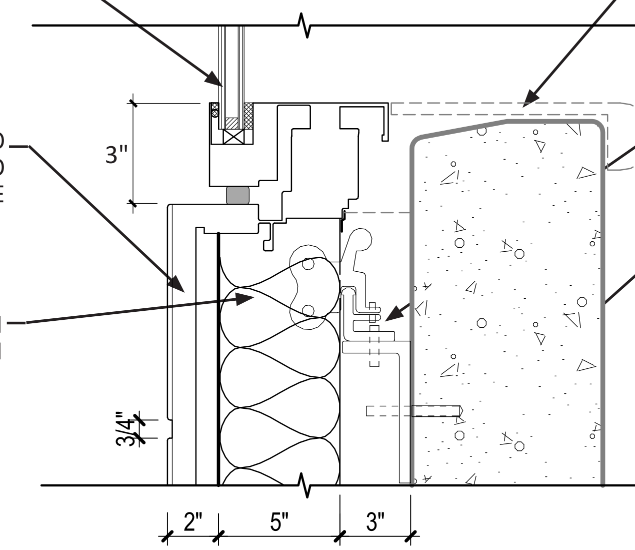
EXISTING SILL DETAIL AT RIBBON WINDOW
NOT TO SCALE



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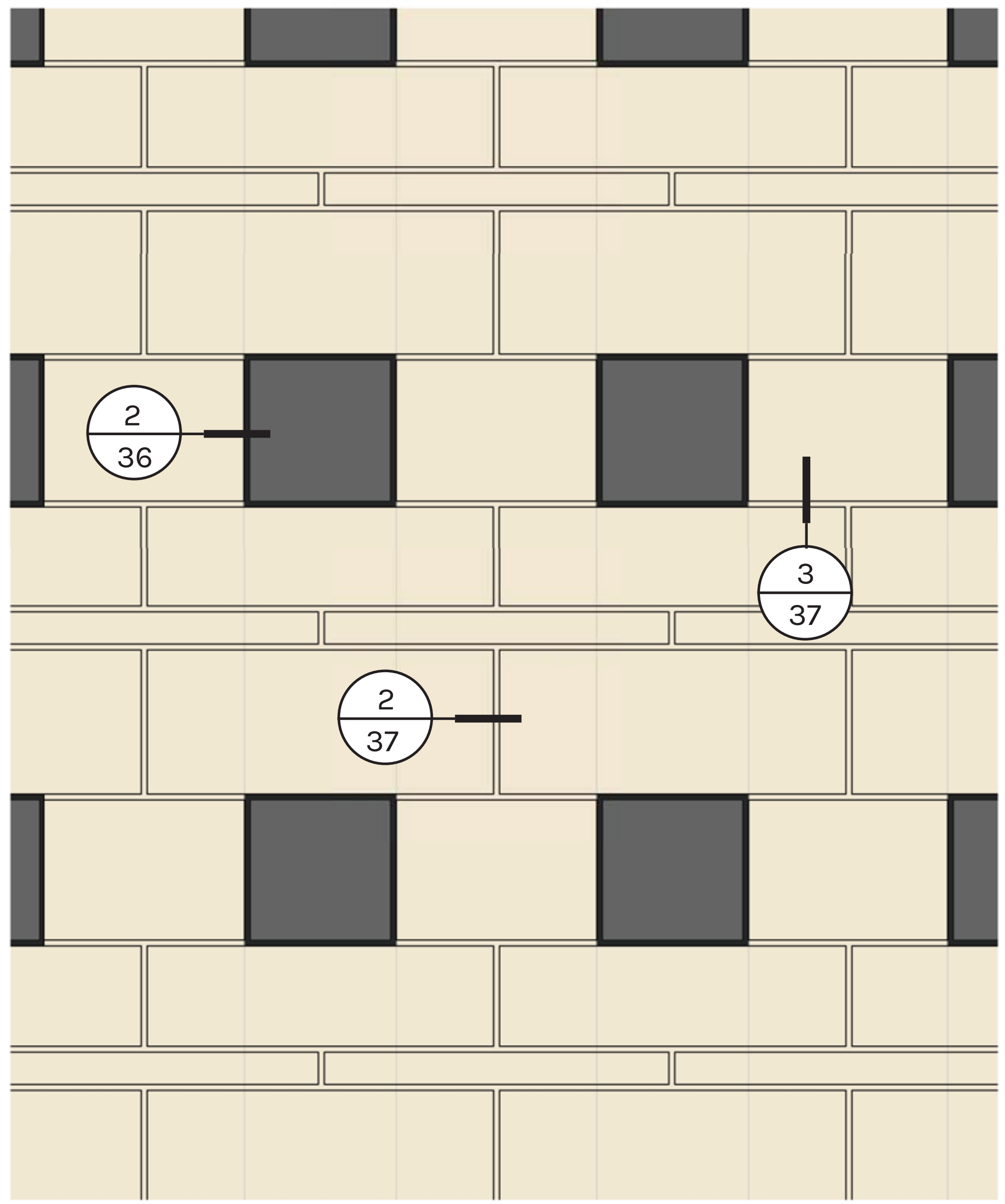
PROPOSED SILL DETAIL AT RIBBON WINDOW
NOT TO SCALE

PROPOSED FACADE DETAILS



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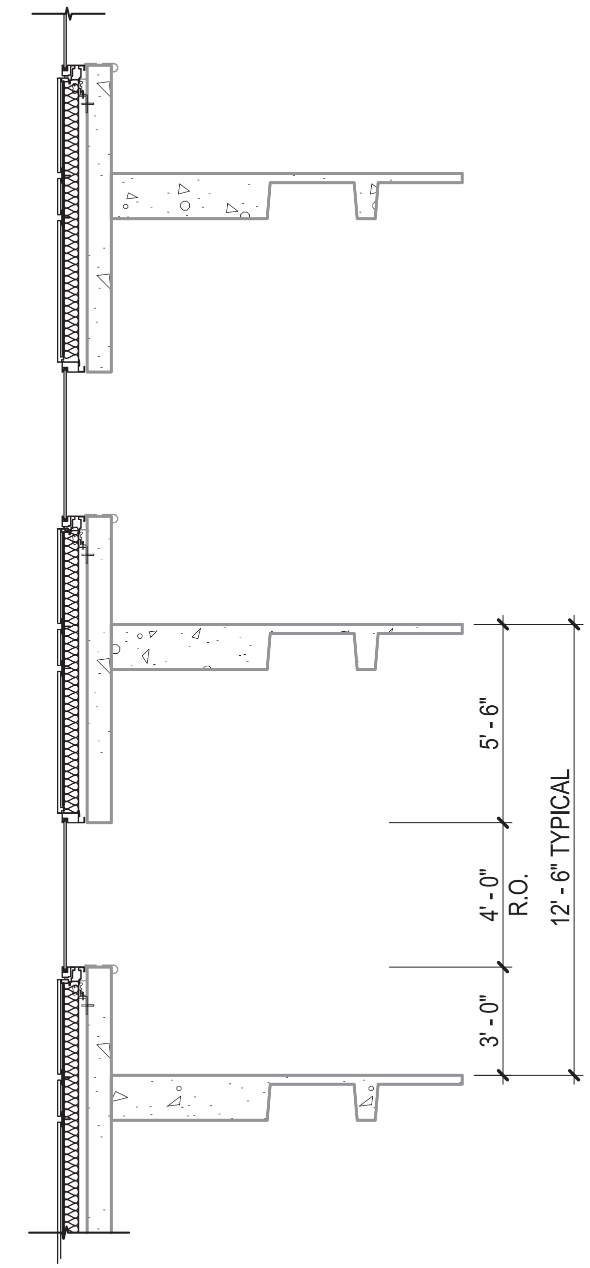
35
TYPICAL ELEVATION AT TOWER
NOT TO SCALE



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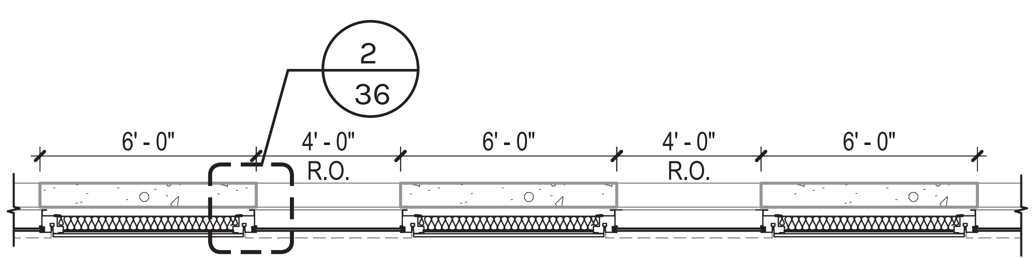
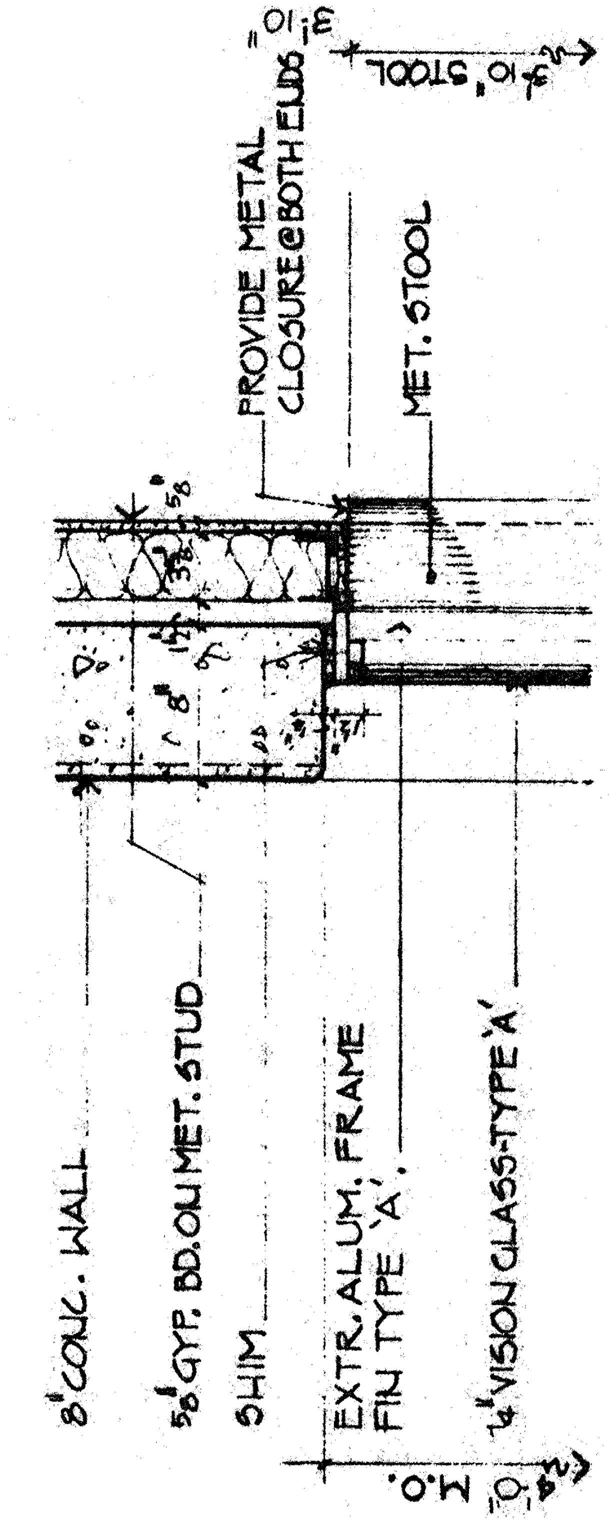
PARTIAL SECTION AT TOWER
NOT TO SCALE

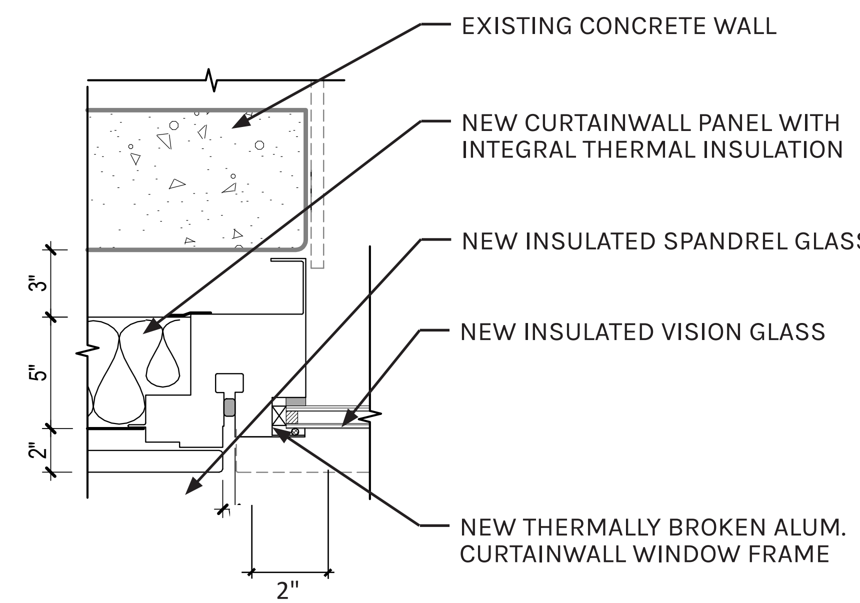


3
35
PARTIAL PLAN AT TOWER
NOT TO SCALE

PROPOSED FACADE DETAILS

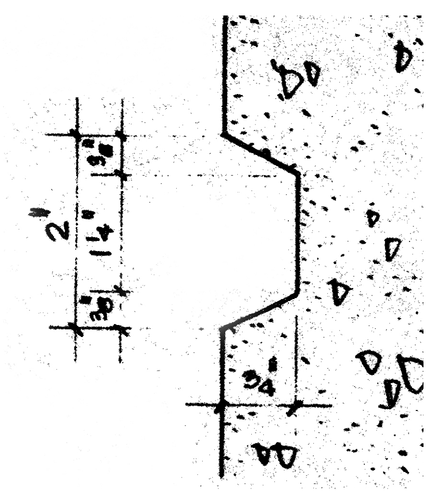


1
36
EXISTING JAMB DETAIL AT PUNCHED WINDOW
NOT TO SCALE



2
36
PROPOSED JAMB DETAIL AT PUNCHED WINDOW
SCALE: 3/16" = 1'-0"

PROPOSED FACADE DETAILS



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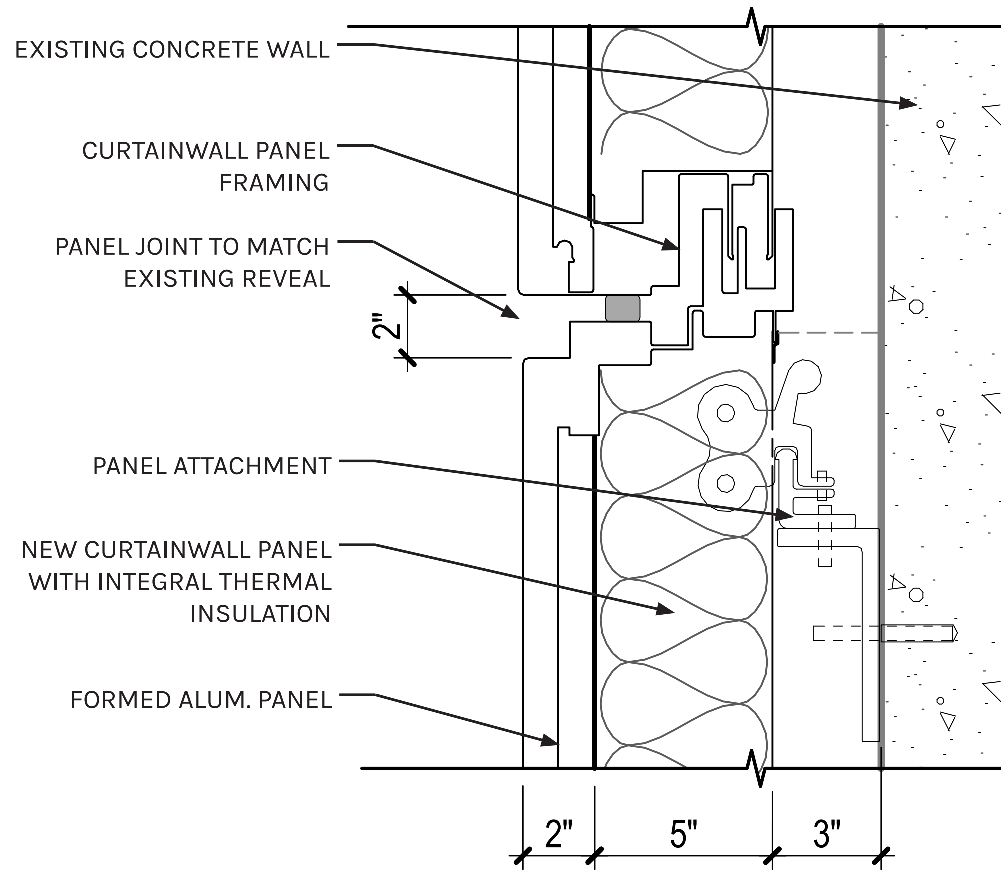

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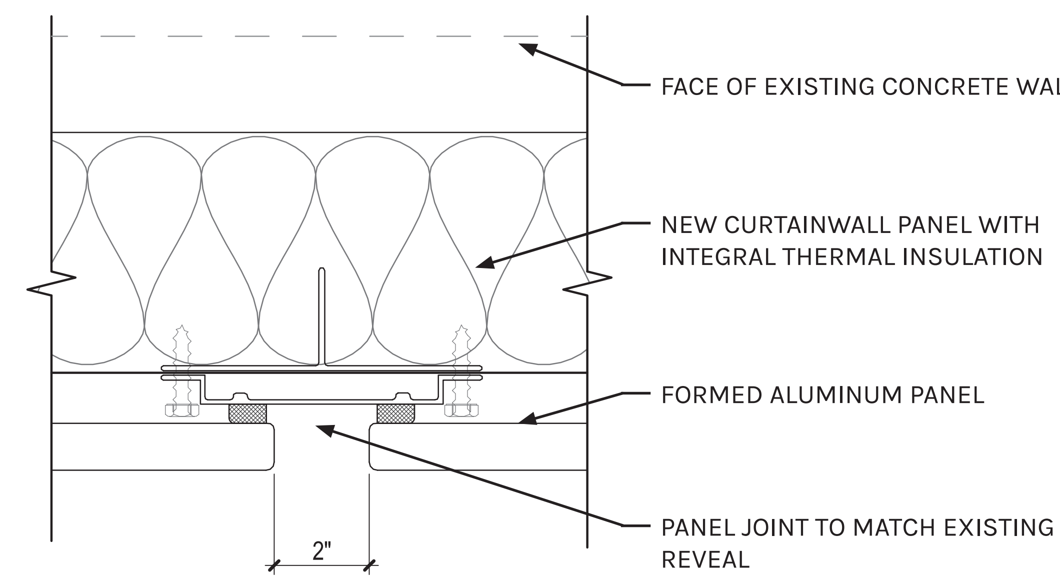

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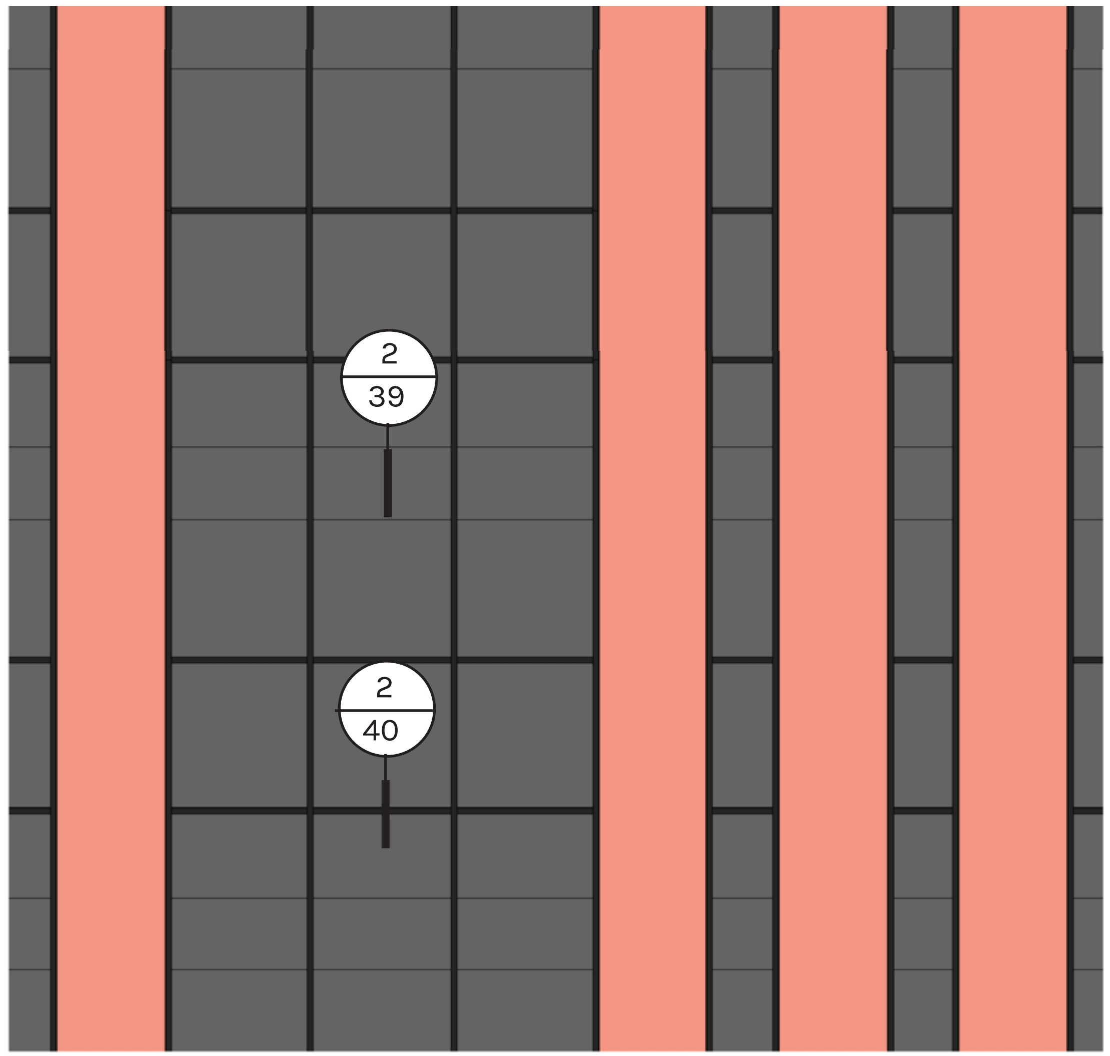
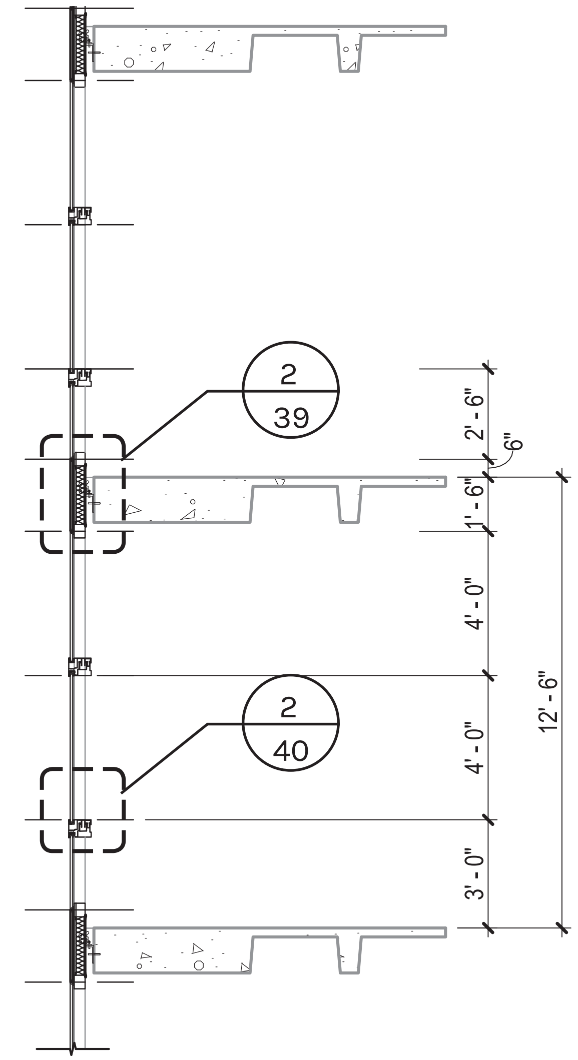
PROPOSED REVEAL DETAIL
NOT TO SCALE

PROPOSED FACADE DETAILS



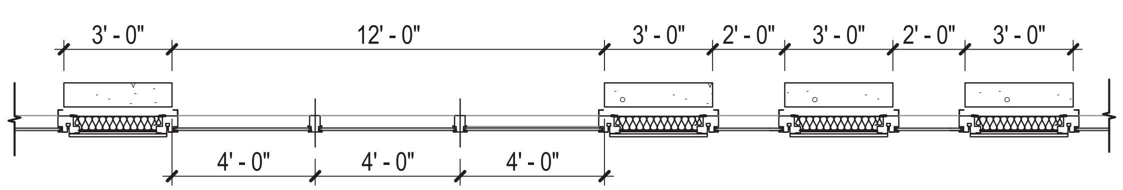
1/38 TYPICAL ELEVATION AT GLAZED CURTAINWALL

NOT TO SCALE



2/38 PARTIAL SECTION AT GLAZED CURTAINWALL

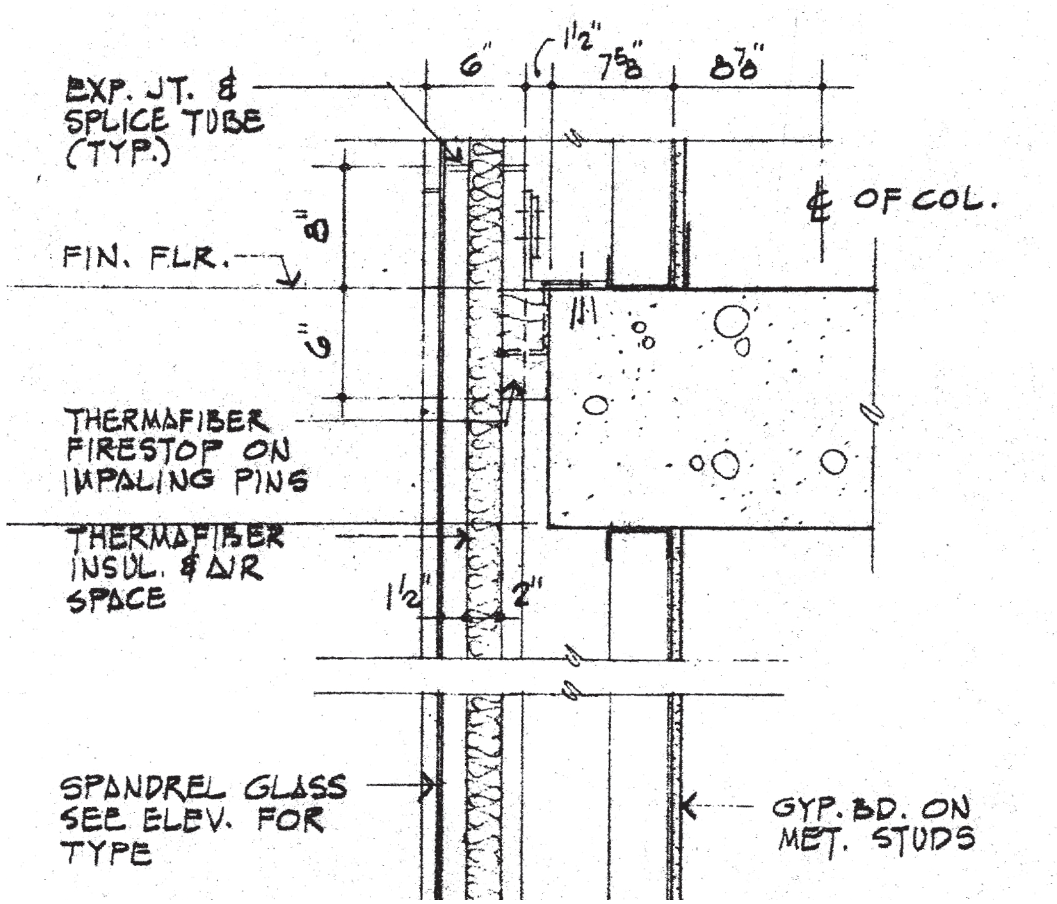
NOT TO SCALE



3/38 PARTIAL PLAN AT GLAZED CURTAINWALL

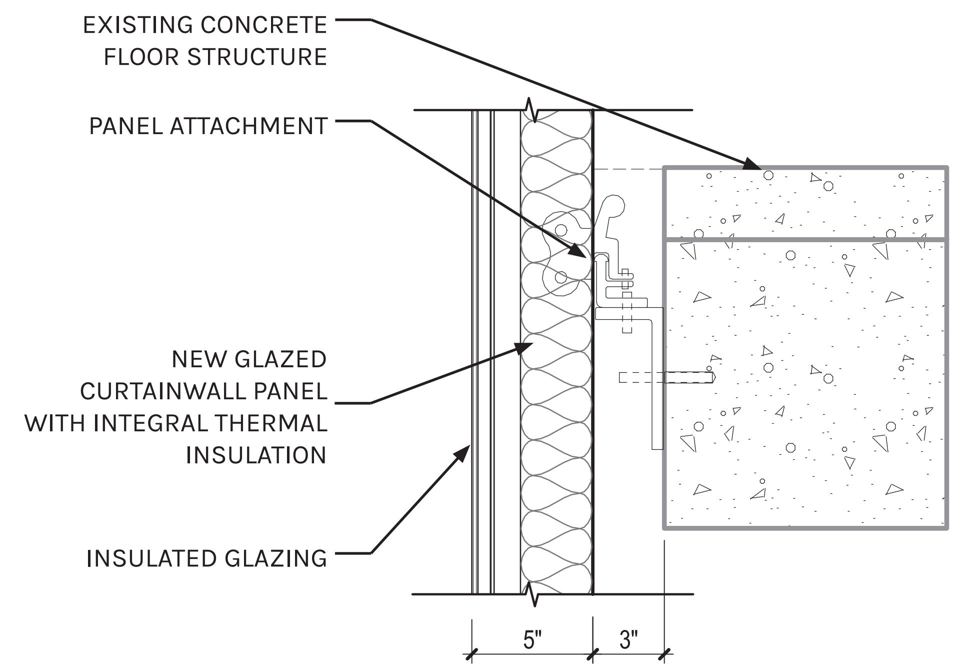
NOT TO SCALE

PROPOSED FACADE DETAILS



1 / 39 EXISTING CURTAINWALL ATTACHMENT

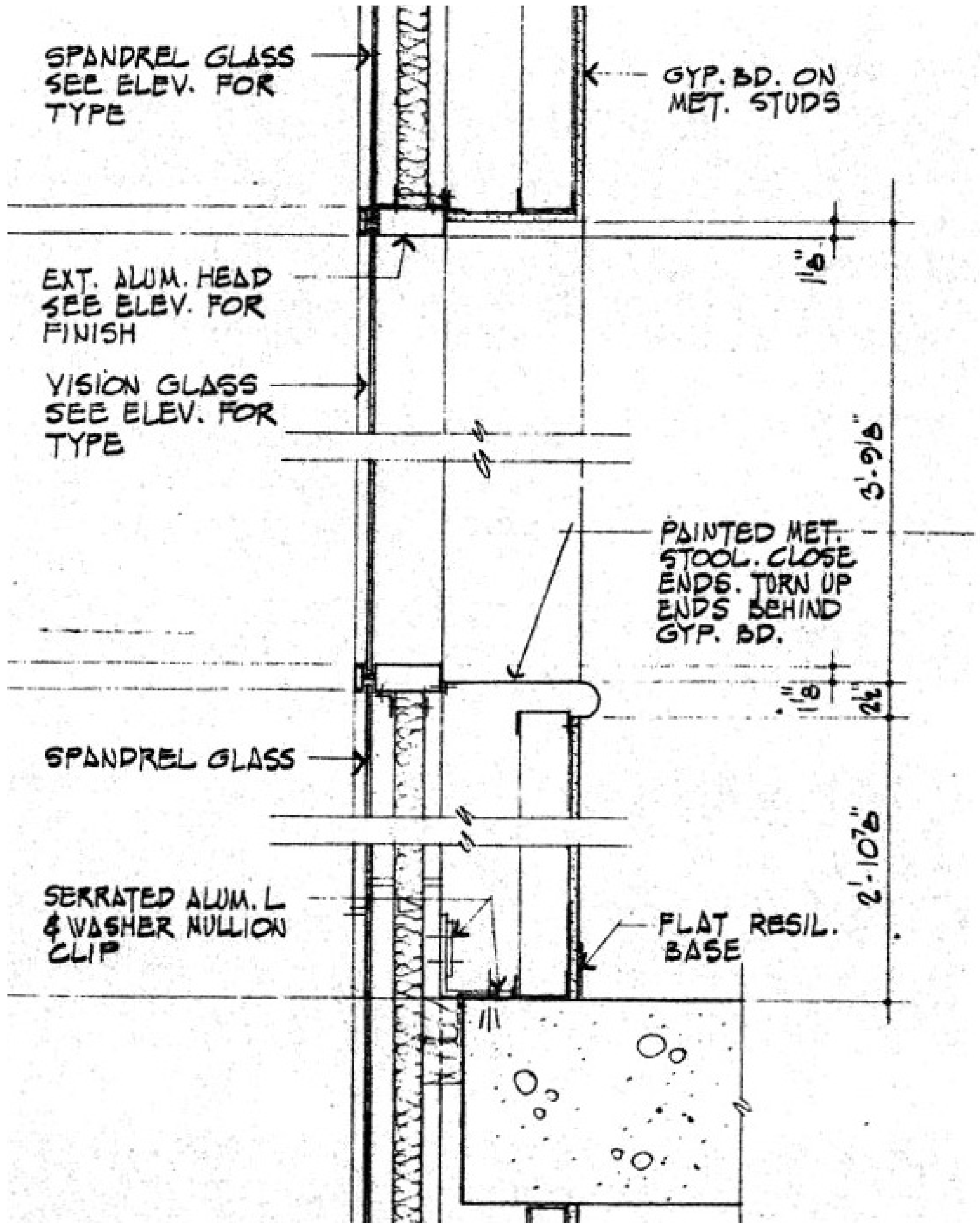
NOT TO SCALE



2 / 39 PROPOSED CURTAINWALL ATTACHMENT

NOT TO SCALE

PROPOSED FACADE DETAILS



1
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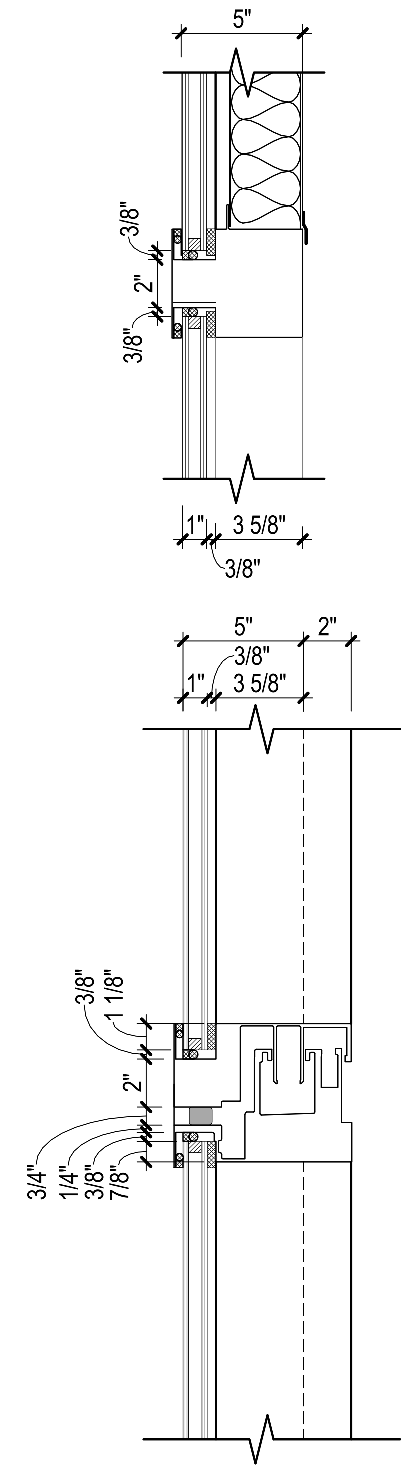
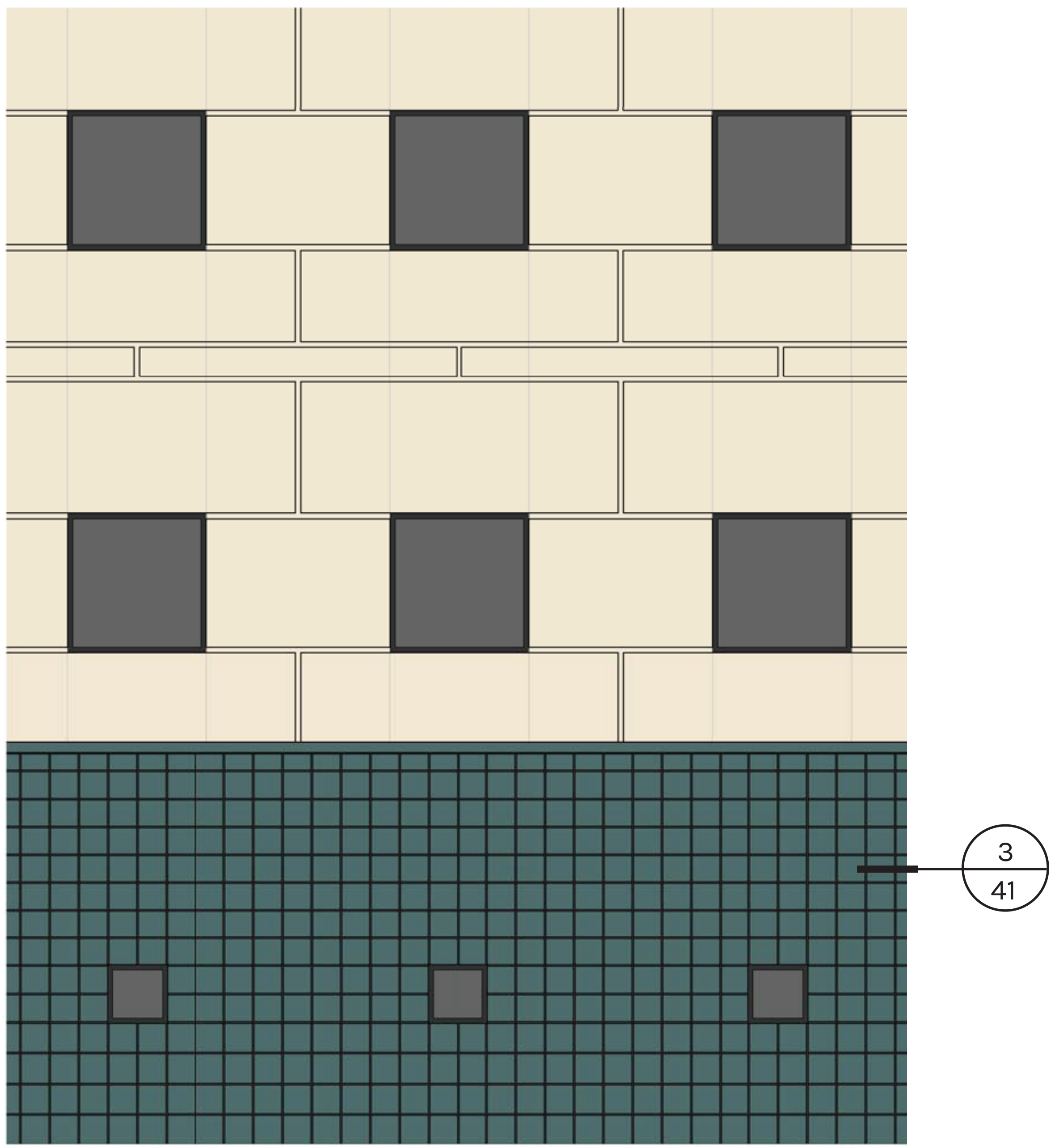
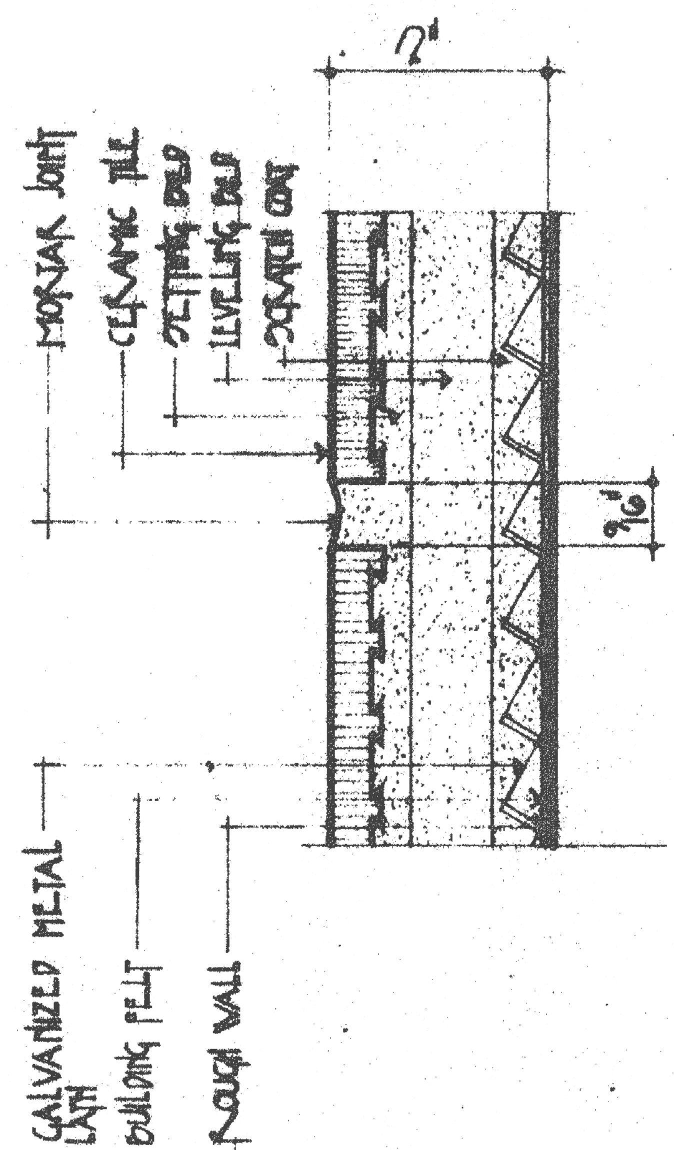
EXISTING CURTAINWALL ASSEMBLY
NOT TO SCALE

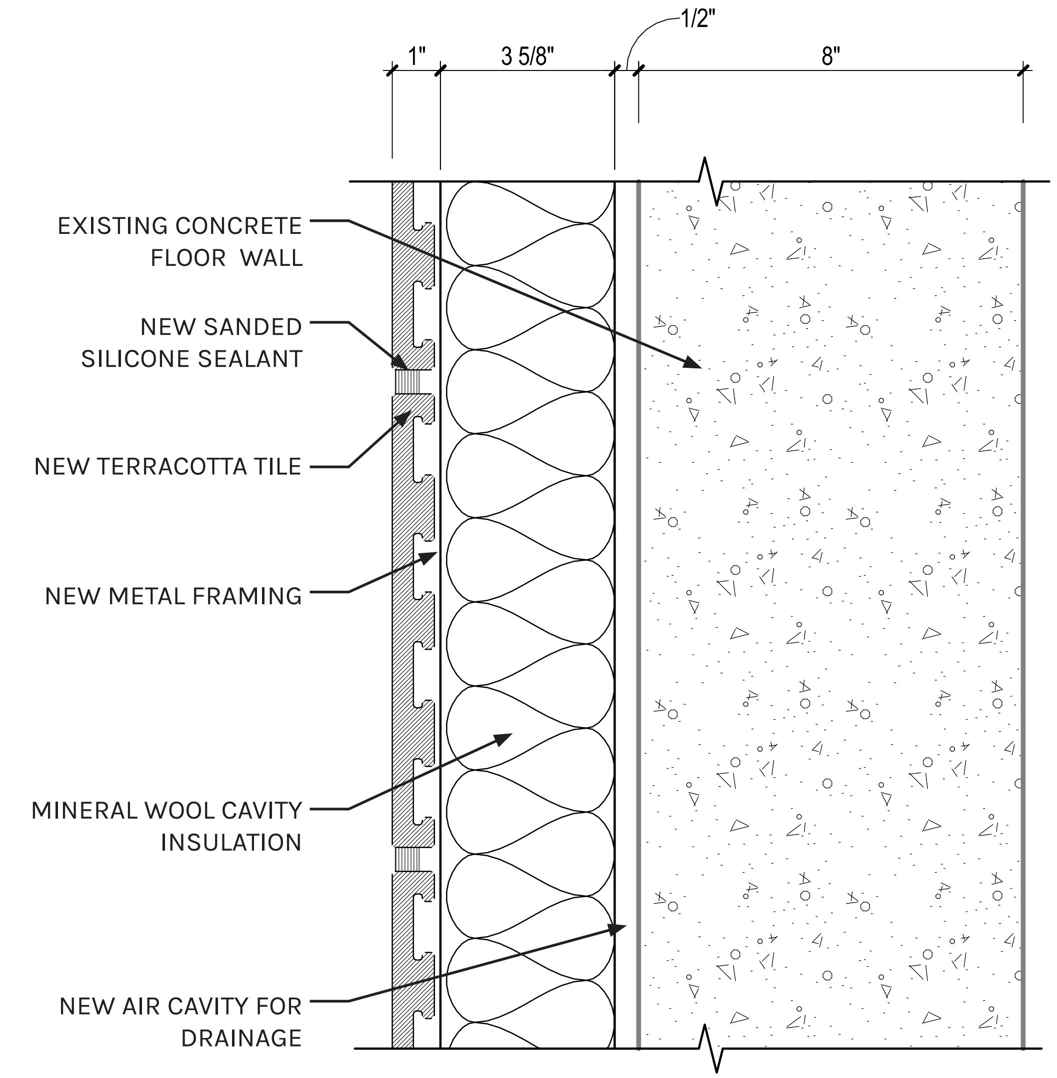


2
40
PROPOSED CURTAINWALL ASSEMBLY
SCALE: 3/16" = 1'-0"

PROPOSED FACADE DETAILS







1/41 EXISTING CERAMIC TILE ASSEMBLY

NOT TO SCALE

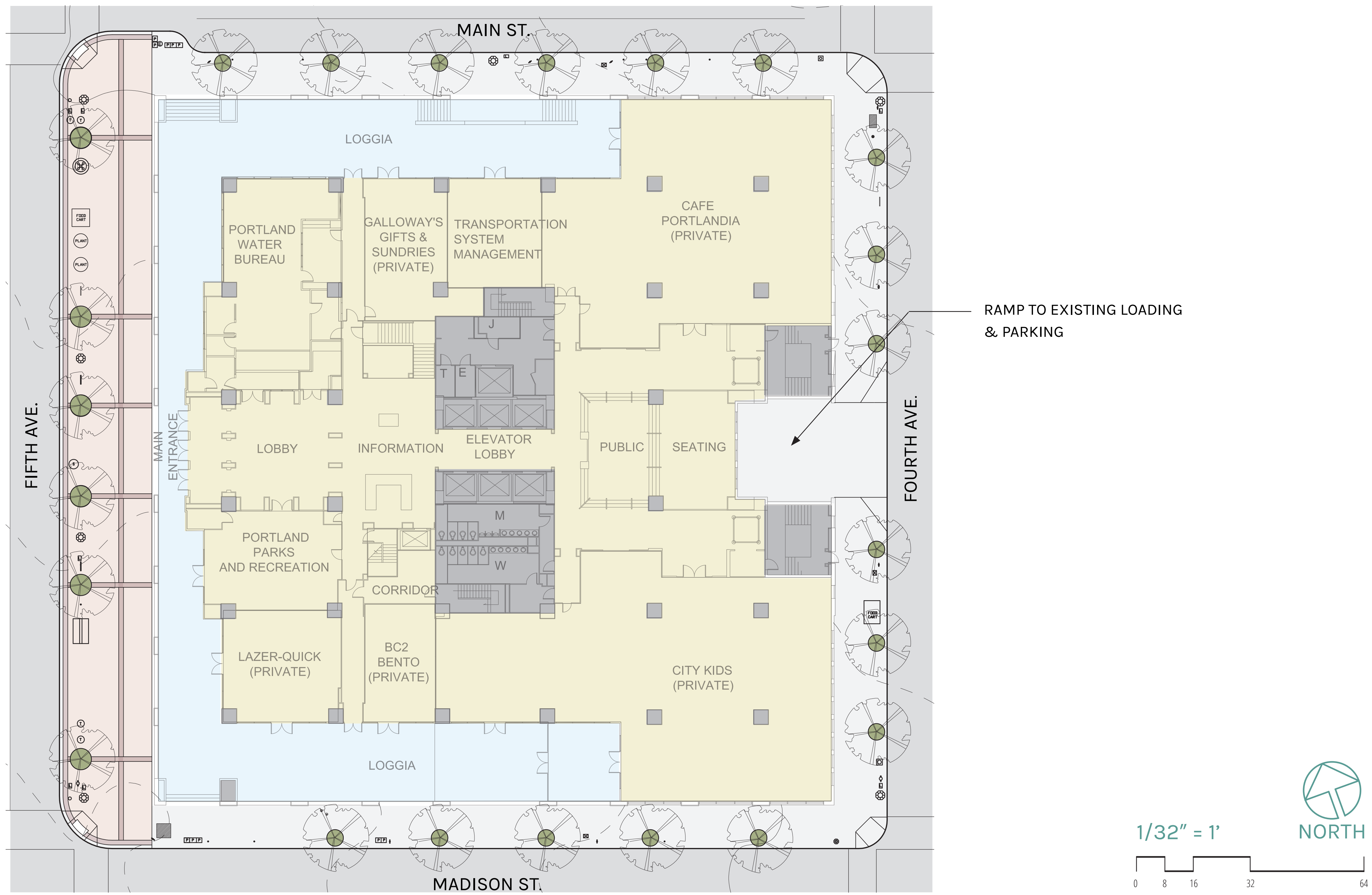
2/41 EXISTING CERAMIC TILE ASSEMBLY

NOT TO SCALE

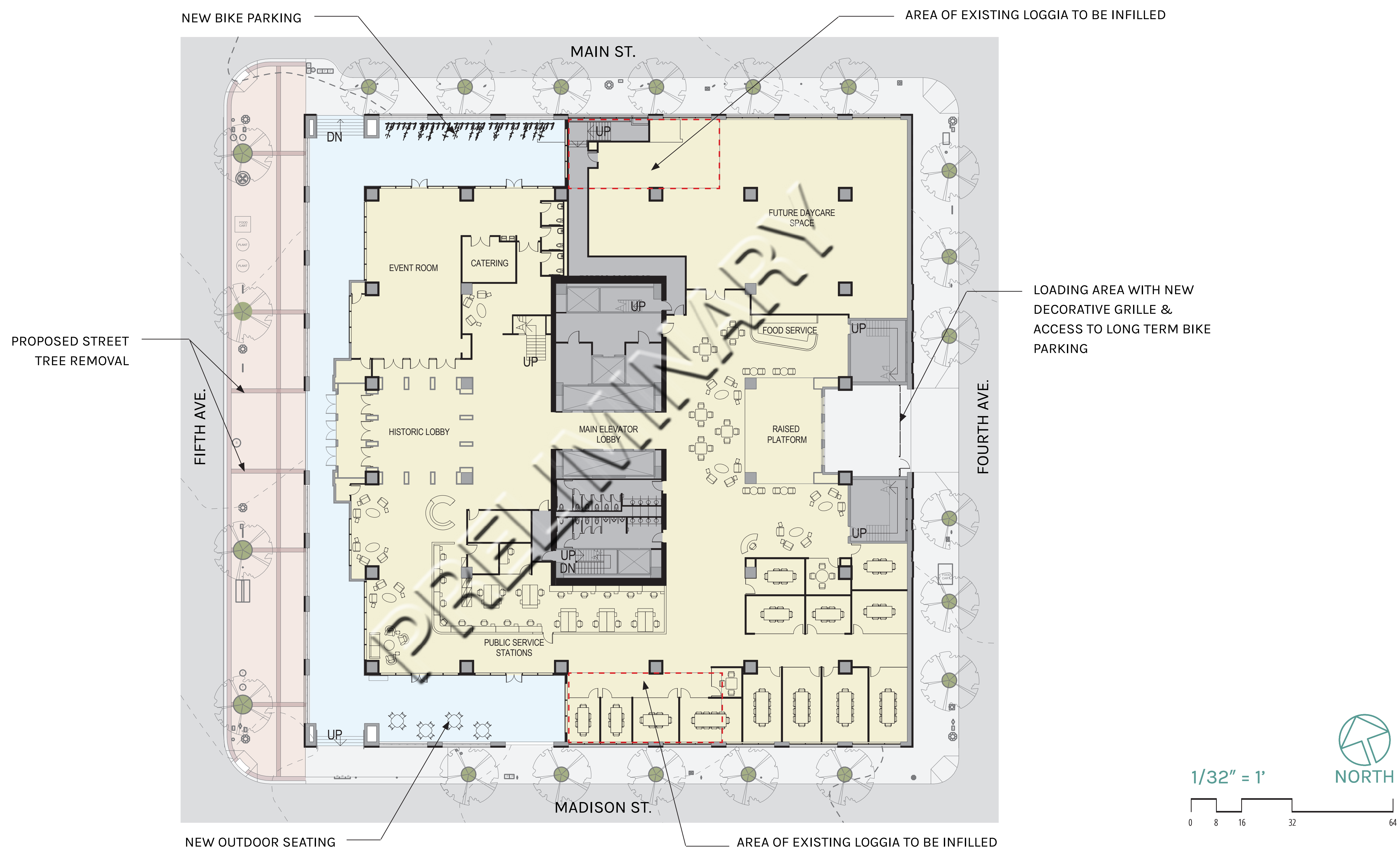
3/41 PROPOSED TERRACOTTA TILE ASSEMBLY

SCALE: 3/16" = 1'-0"

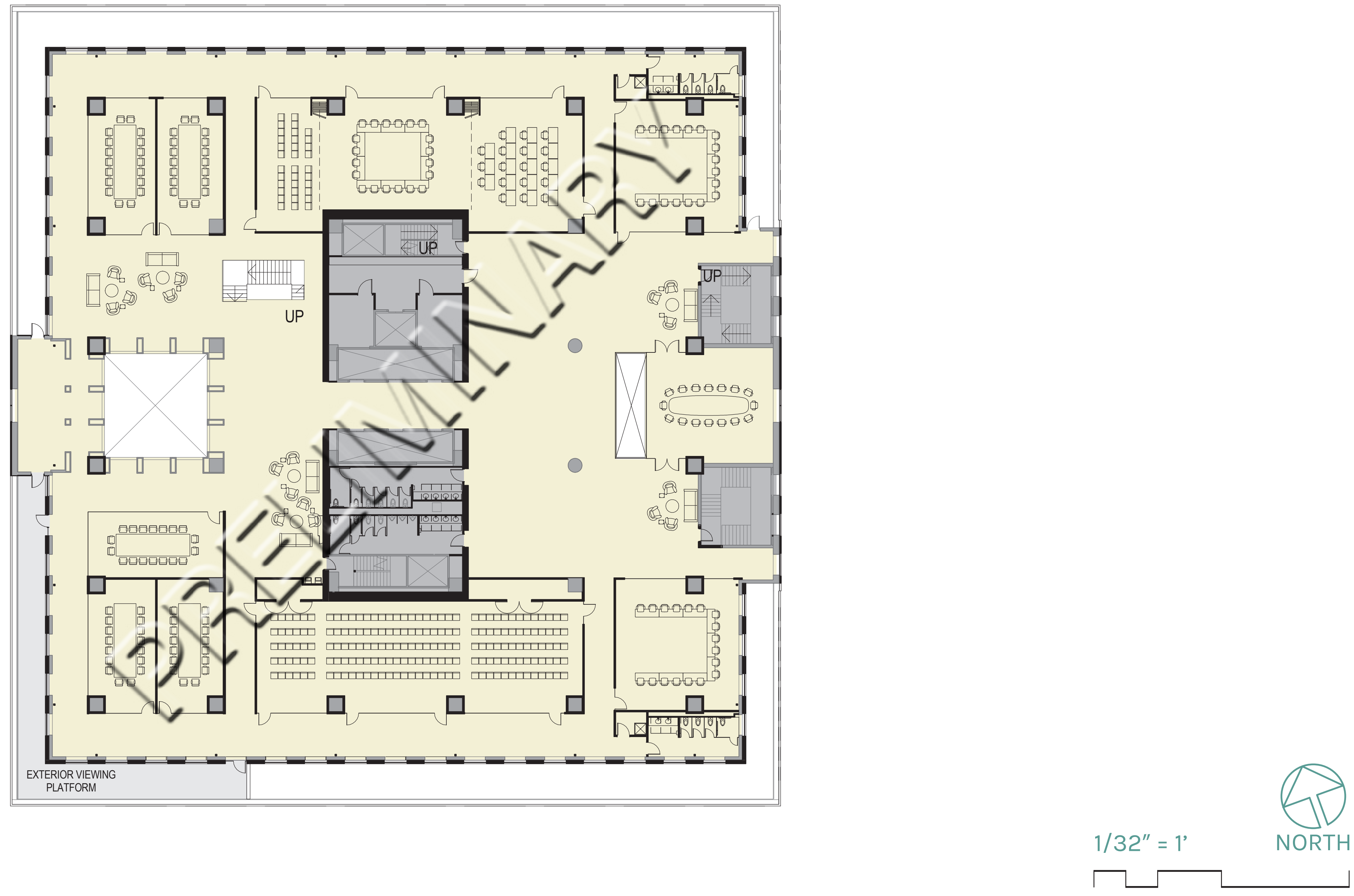
PROPOSED FACADE DETAILS



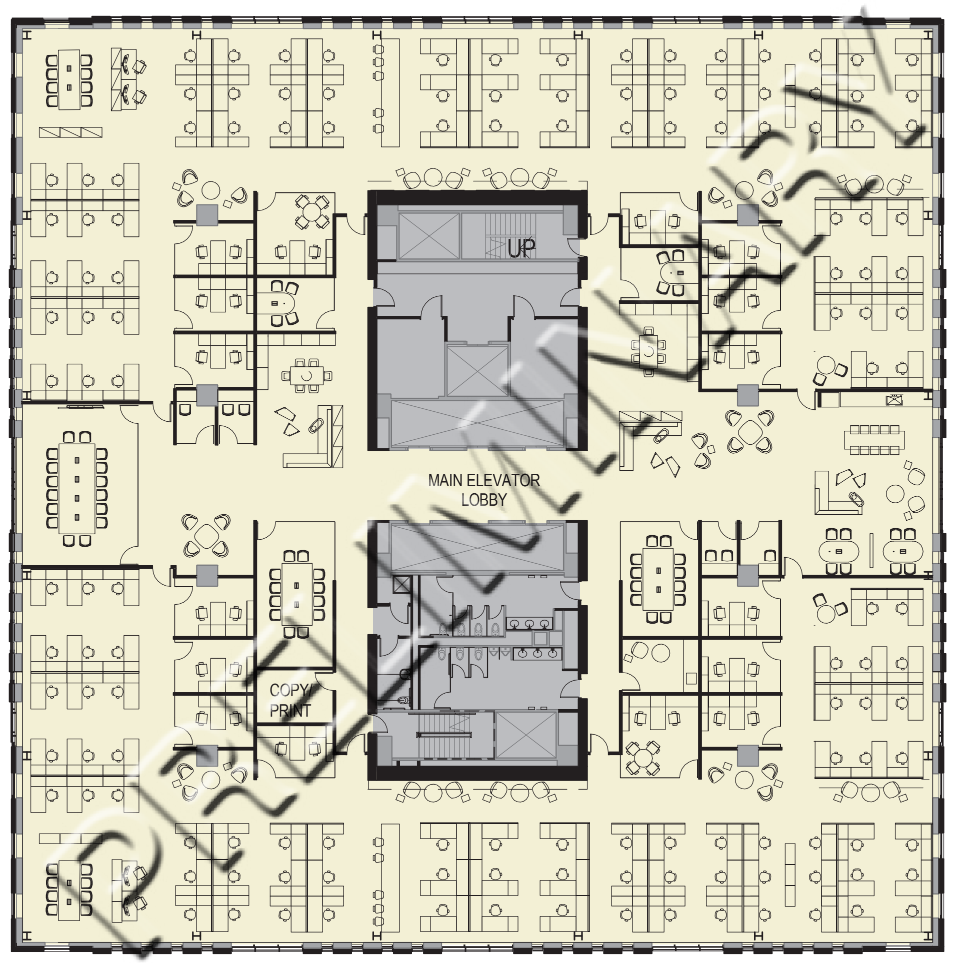
EXISTING FIRST LEVEL / SITE PLAN



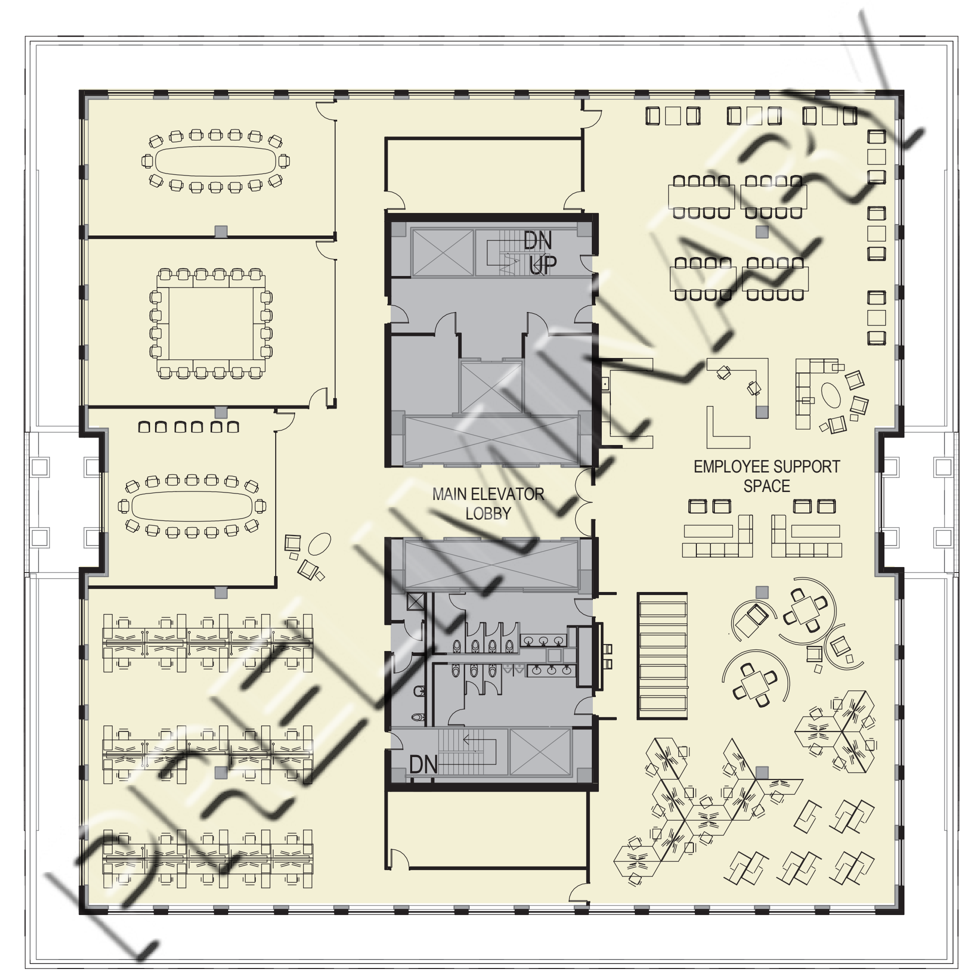
FIRST LEVEL CONCEPT PLAN / PROPOSED SITE PLAN



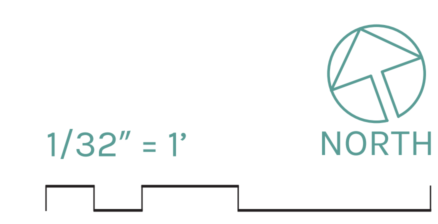
SECOND LEVEL CONCEPT FLOOR PLAN *(FOR REFERENCE)*



TYPICAL TOWER FLOOR PLAN

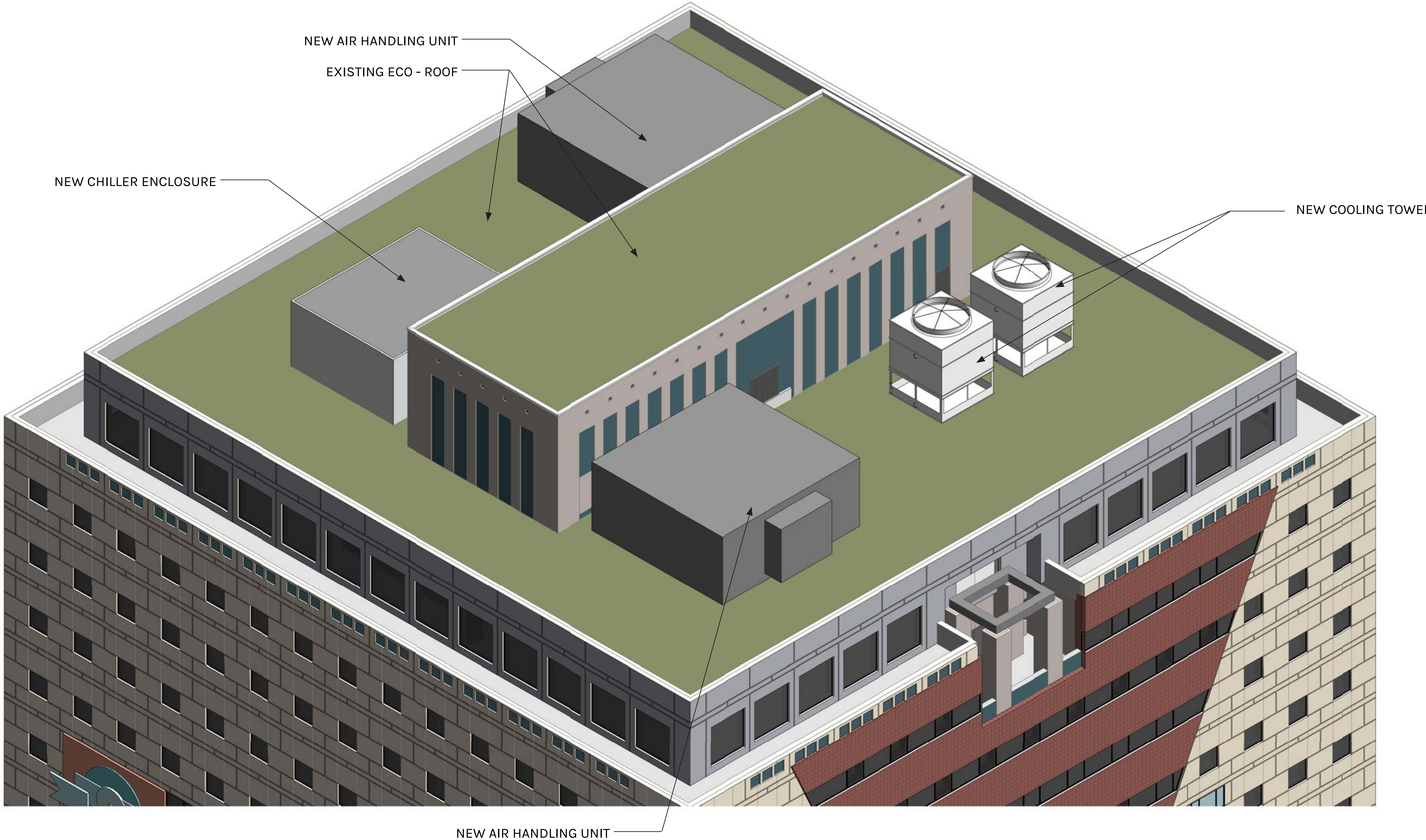


FIFTEENTH LEVEL FLOOR PLAN

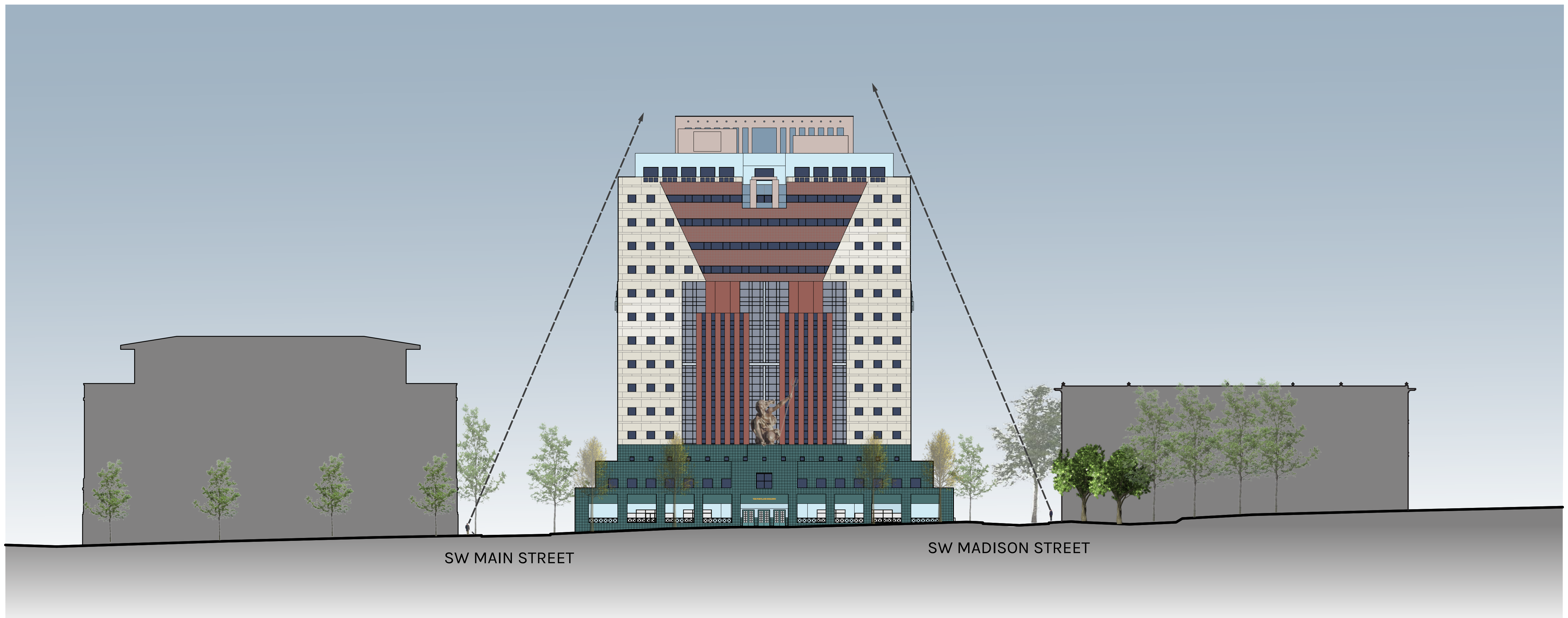


TYPICAL TOWER CONCEPT FLOOR PLANS *(FOR REFERENCE)*

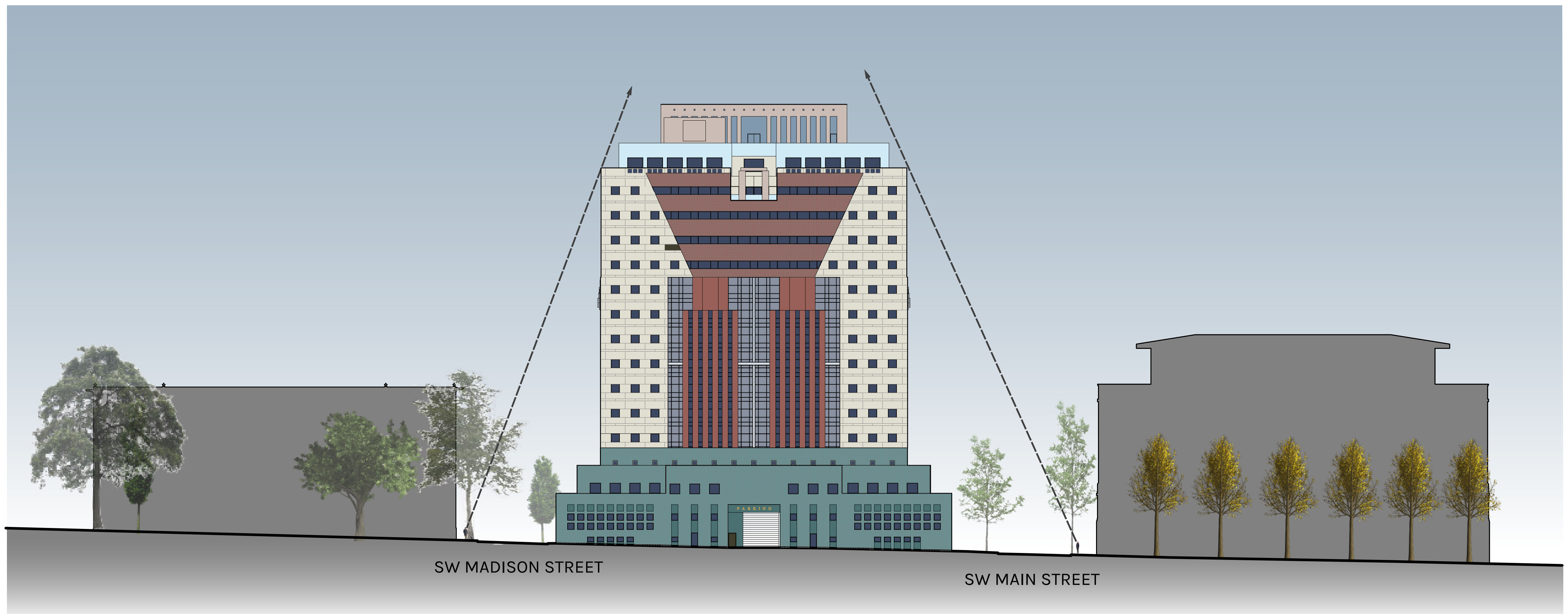
EXISTING ROOF AERIAL VIEW



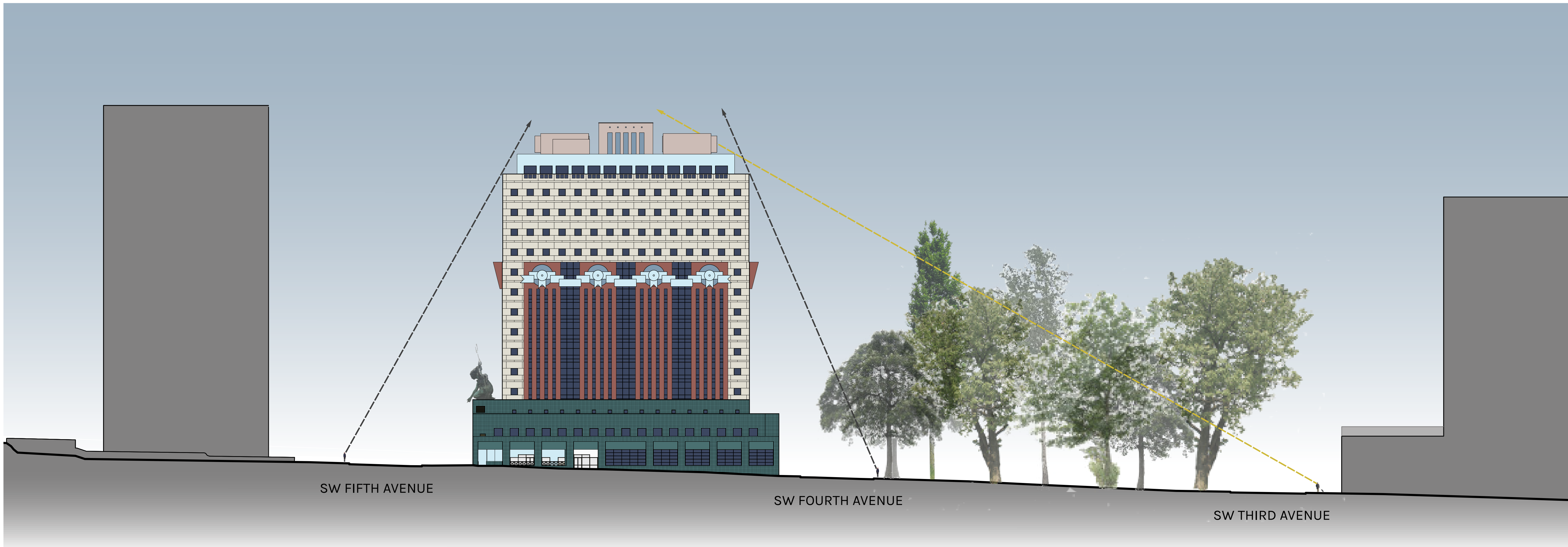
PROPOSED ROOF - AXON



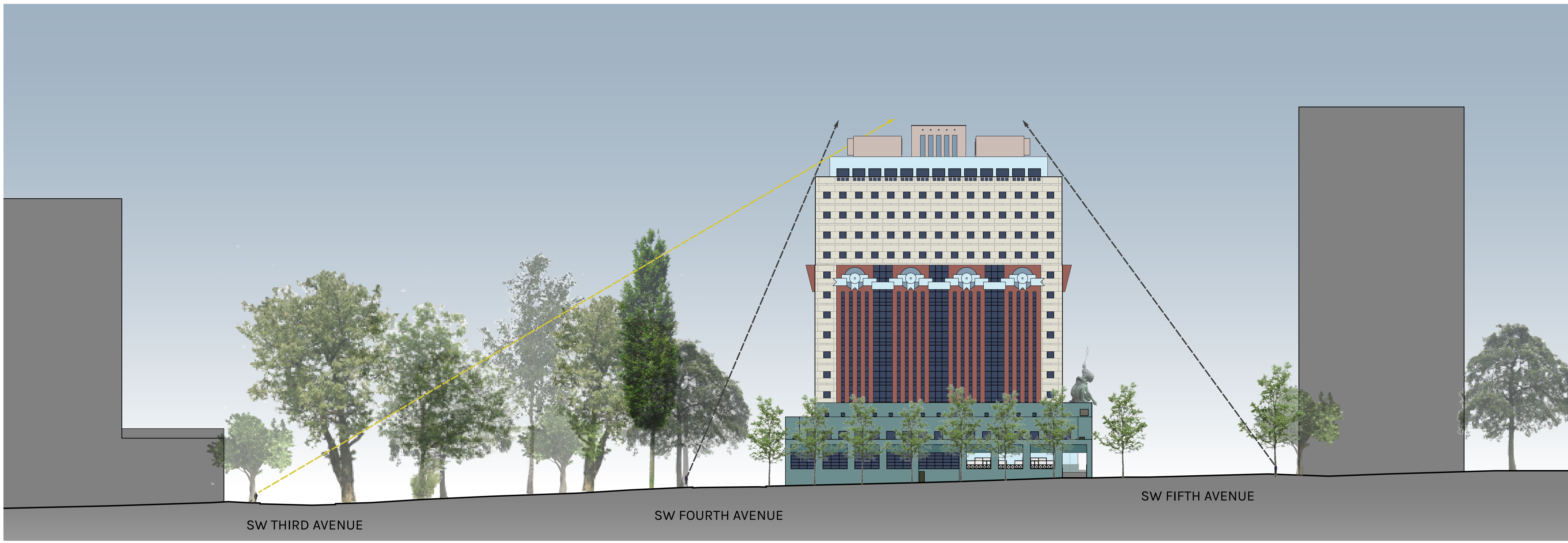
PROPOSED DESIGN VIEW ANGLES - WEST ELEVATION



PROPOSED DESIGN VIEW ANGLES - EAST ELEVATION



PROPOSED DESIGN VIEW ANGLES - SOUTH ELEVATION



PROPOSED DESIGN VIEW ANGLES - NORTH ELEVATION

Existing Loggia

The existing loggia spaces are not well utilized and suffer from several issues including:

- Level changes making ADA access challenging
- Insufficient lighting making the space dark and unpleasant
- Loggia is deep and storefront windows are too low to allow sufficient light into interior spaces

MAIN STREET LOGGIA - EXISTING

Proposed Loggia Improvements

Proposed improvements to the loggia include:

- Reclaim some of the loggia space and convert to interior space. This also eliminates some of the most challenging grade changes.
- Improved lighting and furnishings to make a more welcoming environment
- Raise storefront transoms to maximize light to the interior spaces

MAIN STREET LOGGIA - PROPOSED

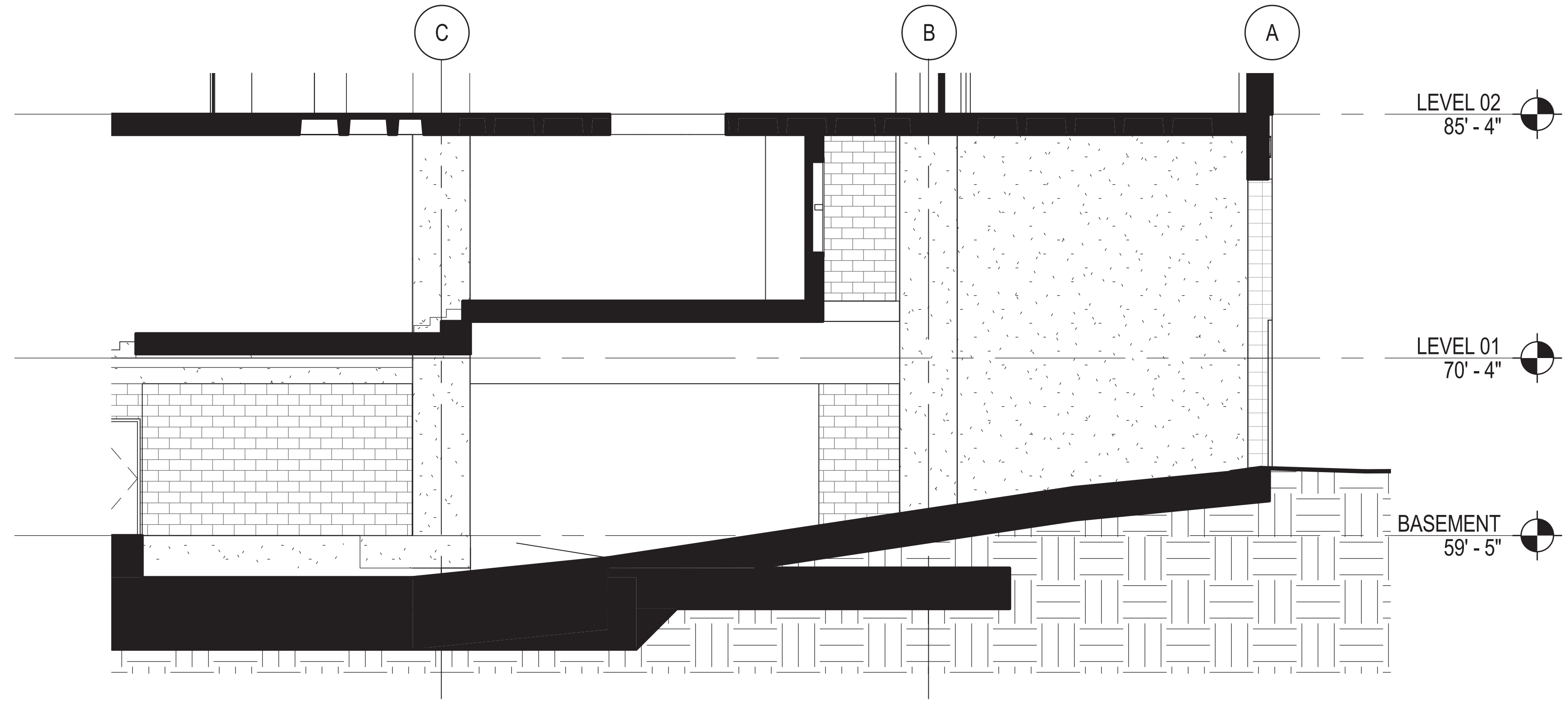
SW MADISON ST LOGGIA - EXISTING

SW MADISON ST LOGGIA - PROPOSED

Fourth Avenue Loading Area

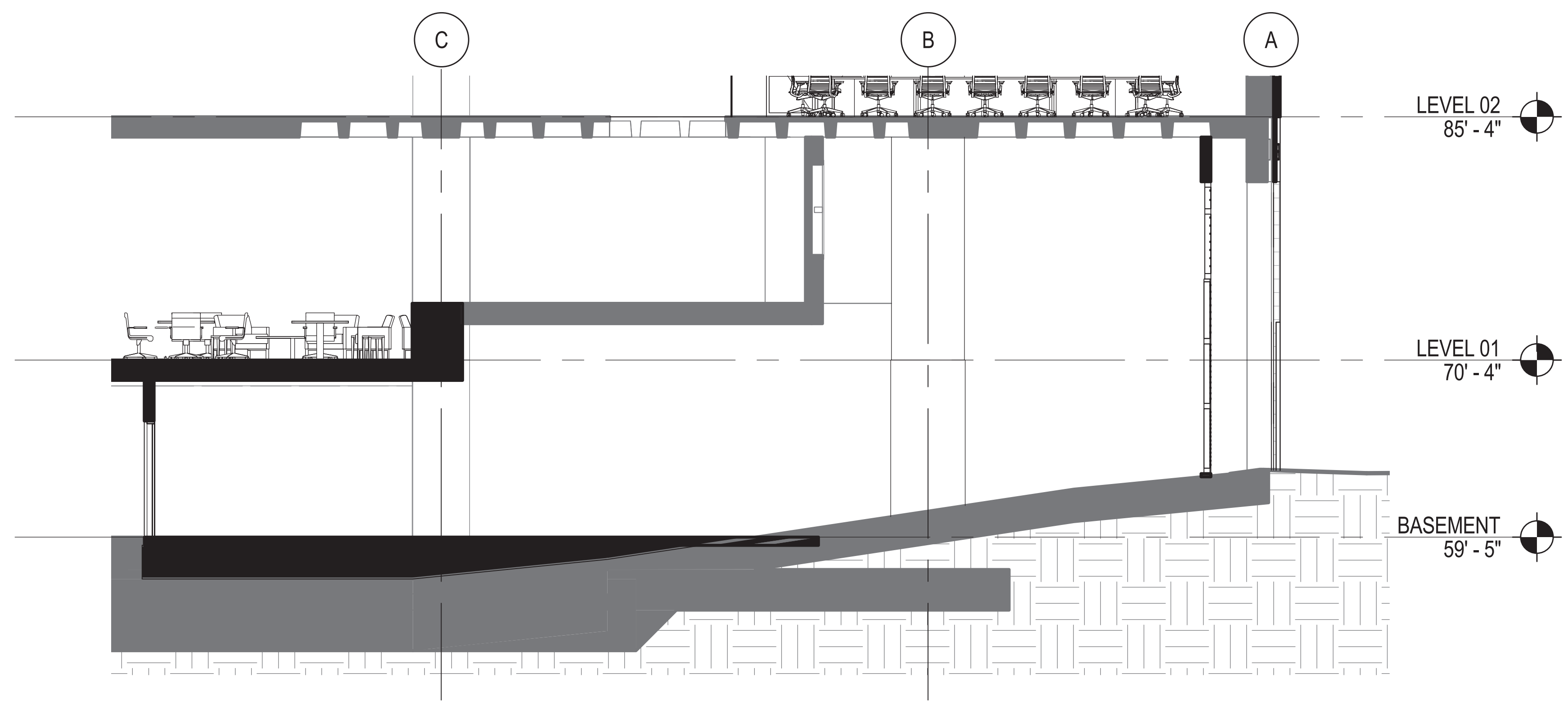
The existing loading dock and vehicle parking area create a challenging feature at the focal point of the Fourth Avenue facade. The existing ramp to the loading area was originally built too steep to accommodate large trucks and is not used for large truck deliveries. While the loading area is a feature that needs to be maintained to facilitate necessary building operations such as small deliveries and trash removal, the proposed design is to minimize the utilitarian feel. The proposed design is to:

- Replace the existing opaque roll up door with an open screen and bring it out further to the face of the building. The team is exploring the possibility of making this screen a public art piece that would enhance the pedestrian experience along Fourth Avenue
- Eliminate vehicle parking in the basement and maintain only the minimum vehicle access required for trash and small deliveries
- Level out the slab at the loading area to decrease the ramp angle. The existing overhead height will still not allow large truck deliveries, but will make small vehicle deliveries easier and safer
- Add more long-term employee bike parking to the basement and provide direct access from the street



WALL SECTION - LOADING BAY EXISTING

SCALE: 3/32" = 1'-0"



WALL SECTION - LOADING BAY PROPOSED

SCALE: 3/32" = 1'-0"

FOURTH AVE. LOADING AREA - SECTIONS

EXISTING

PROPOSED

FOURTH AVE. LOADING AREA

HISTORIC APPROVAL CRITERIA RESPONSE

1. Historic character. The historic character of the property will be retained and preserved. Removal of historic materials or alteration of features and spaces that contribute to the property's historic significance will be avoided.

Response: The Portland Building is a unique Postmodern resource that was built in 1982. The attributes that comprise its historic character are different from many older, pre-Modernist resources where character is imbued in large part through materials and details that convey the craftsmanship of its construction. Some of the primary character-defining features of Postmodern architecture, however, are the concepts and ideas expressed in its visual design. True to its style, the Portland Building's character does not directly come from its materials and workmanship but instead comes from Michael Graves' defining composition of colorful surfaces and geometries that plays out in an iconic and diagrammatic design.

Because of extensive material failures that cannot be repaired or replaced in-kind, this proposal seeks to reconstruct a new envelope over the existing skin, expanding the overall building enclosure by several inches while adhering to existing planar relationships between materials as closely as possible. The existing material will not be demolished, but will remain underneath. The new skin will remedy the water intrusion issues that have plagued the building since it was constructed, while duplicating the visual qualities of the Portland Building that define its historic character. The building's failed systems cannot be replaced with the same materials, but new glass, aluminum plate panels, and terracotta tile will be carefully detailed so that Michael Graves' design and the qualities that make the building an important example of Post Modernism will persist via reconstruction.

The precedent examples provided in this submittal demonstrate how many significant modern resources have faced material failures of a similar magnitude. The use of alternate materials that convey visual qualities similar to the building's original materials have not resulted in a significant loss of integrity or character. We believe the Portland Building Reconstruction can employ a similar approach and retain the building's historic character.

2. Record of its time. The historic resource will remain a physical record of its time, place, and use. Changes that create a false sense of historic development, such as adding conjectural features or architectural elements from other buildings, will be avoided.

Response: While original failing exterior materials will no longer be a part of the visible physical record, the design will be replicated with new, visually-duplicative replacement materials. As described above, the visual design is the most important aspect of the Portland Building's character, integrity, and the physical record. For many older (pre-WWII) historic resources, materials and workmanship typically play a greater role in defining the physical record and what is significant about the property. With a Postmodern resource like the Portland Building that has mass-produced parts creating an iconic composition of painted shapes and surfaces, the materials themselves become a much less important part of the physical record than the preservation of the composition as a whole (provided, of course, that replacements continue to support the visual authenticity of that composition).

As detailed in this submittal, a fully rehabilitated Portland Building with a reconstructed skin will reflect the design that was constructed in 1982, thus maintaining the historic resource as a physical record of its time, place, and use. The compatible alterations made to the glazing, loggia, and 4th Ave entrance do not have a negative effect on the building's integrity or record of its time, yet greatly enhance occupant/visitor experience and building function. The scale of these alterations is relatively small compared to the building as a whole and they are proposed to be done in a compatible, understated manner.

Lastly, the proposed work for this project adds no conjectural features or architectural elements from other buildings, nor does it attempt to recreate some of Michael Graves' early unrealized designs for the building—all of which would create a false record of how the Portland Building developed.

3. Historic changes. Most properties change over time. Those changes that have acquired historic significance will be preserved.

Response: The Portland Building does not have important changes to its original construction that have gained historic significance over time. The proposed project will reconstruct the building in a manner that conveys the same design and character as what exists today.

4. Historic features. Generally, deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement, the new feature will match the old in design, color, texture, and other visual qualities and, where practical, in materials. Replacement of missing features must be substantiated by documentary, physical, or pictorial evidence.

Response: The Applicant recognizes that for historic resources, repair is preferred over replacement whenever possible. The majority of modern-era materials and assemblies have far shorter life expectancies than traditional materials and assemblies, and are not repairable in the traditional sense—especially complex assemblies. During the Modern/Postmodern era, many assemblies were used in their infancy, often employing methods that were later significantly improved upon or abandoned altogether for better technology.

The Portland Building suffers the effects of budget and design deficiencies that resulted in a building enclosure that is fatally flawed. The concrete structural wall protected only by paint combined with curtainwall systems that cannot properly integrate create a building envelope that is predisposed to leaks.

In the case of the Portland Building, the severity of deterioration of the building's exterior necessitates reconstruction by over-cladding the existing skin with a new skin. These new materials will match the old in design, color, texture, and other visual qualities, taking into account how and where these materials are experienced. That is, an emphasis will be placed on having the closest material match at the tactile pedestrian level. However, for materials experienced from a distance where perception of texture and other fine-grain visual qualities are less critical, these conditions allow for different types of replacement materials to be considered, yet still be compatible and supportive of the building's integrity. In many ways, the entirety of the Portland Building—its colorful, diagrammatic composition as a whole—is the historic feature and through careful reconstruction of the exterior, this building will be preserved for generations to come.

5. Historic Materials. Historic materials will be protected. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials will not be used.

Response: There are no major original assemblies that are in a repairable or reusable condition at the Portland Building's exterior. Reconstruction will occur over historic materials and will replicate their look and feel, staying true to the design expressed by the historic resource. Window frames with glazing will replicate the original sightlines, and mullion arrangements of the original windows. While the light-transmitting and solar qualities of the new glass will be altered, these improvements to daylighting and energy performance will not alter the exterior appearance in a conspicuous or incompatible manner. At the concrete, painted aluminum plate panels will duplicate the painted surface of the concrete face, as well as its reveal size, patterns, and alignments. And at the tile, tiles applied to aluminum panels will duplicate the original patterns, color, texture, and relative scale of the original teal-colored clay tile at the ground floor.

6. Archaeological resources.

Response: Not applicable.

7. Differentiate new from old. New additions, exterior alterations, or related new construction will not destroy historic materials that characterize a property.

Response: This approval criterion is most applicable with respect to the alterations proposed at the loggia and Fourth Avenue garage entrance. The proposed alterations for both of these areas balance compatibility with differentiation. A small amount of change will be made to make the spaces more functional and welcoming. New materials will complement but not compete or create contrast with primarily envelope materials. Original openings will still be readable, therefore not altering the rhythm and organization of Graves' design. The aim is that these alterations feel "in-keeping" with the building, but upon study, they are recognizable as new elements.

For the reconstruction portion of the project, the Applicant seeks to replicate Graves' design in a new weather-tight exterior wall system rather than create overtly differentiated new work. While the reconstructed Portland Building will look substantially like the Portland Building nominated to the National Register, the new construction will be identifiable by building professionals as non-original materials. Upon inspection, there will be no confusion as to what is historic and not, given that the existing skin will be entirely over-clad.

8. Architectural compatibility. New additions, exterior alterations, or related new construction will be compatible with the resource's massing, size, scale, and architectural features. When retrofitting buildings or sites to improve accessibility for persons with disabilities, design solutions will not compromise the architectural integrity of the historic resource.

Response: Like the response above regarding differentiation, the Applicant seeks to replicate the design as closely as possible. Given the circumstances where the building's highly degraded exterior materials must be replaced, reconstruction is a compatible approach that maintains architectural integrity but also repairs the building for the long term.

As also mentioned above, the alterations proposed at the loggia and Fourth Avenue garage entrance create a small amount of change that minimally affects the building's integrity. New materials will complement but not compete or create contrast with primary envelope materials. Original openings will still be readable, therefore not altering the primary design features.

9. Preserve the form and integrity of historic resources. New additions and adjacent or related new construction will be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic resource and its environment would be unimpaired.

Response: The primary drivers of the Portland Building's integrity are design, setting, feeling, and association. This holds true for many resources for the modern era because of the primary importance of how the design fulfills the larger ideas of stylistic theory. With materials and workmanship being less critical, the Portland Building with a new skin over the historic failed skin does not irrevocably harm the resource's integrity nor jeopardize its listing in the National Register. In addition to continuing to communicate the building's form, diagrammatic areas of shape and color, and its ornament, the design for the reconstruction also captures smaller design components that effect integrity including relationship between parts and planes; reveals/shadow lines; sheen, texture, and reflectivity; material differentiation; and areas of increased design emphasis/material quality such as the pedestrian level. All of these efforts preserve the form and integrity of the resource.

10. Hierarchy of compatibility. Exterior alterations and additions will be designed to be compatible primarily with the original resource, secondarily with adjacent properties, and finally, if located within a Historic or Conservation District, with the rest of the district. Where practical, compatibility will be pursued on all three levels.

Response: The proposed work for the Portland Building achieves compatibility because it replicates the iconic forms and colors of Michael Graves' design. The project is inherently compatible because the building will be largely the same. Proposed changes to enhance functionality, such as changing tinted glass to vision glass, infilling portions of the loggia bays, and reconfiguration of the Fourth Avenue entry, are also compatible because they continue to communicate the original design intent while improving functionality. The glazed areas of the skin will still be glazed even though they will be replaced with vision glass instead of tinted glass or opaque spandrel. The openings at the loggia and Fourth Avenue will still be readable at the tile opening when they have been infilled with window systems.

HISTORIC APPROVAL CRITERIA RESPONSE

Appendix A

Facade Forensics Enclosure Report

Facade Forensics is the envelope consultant for the Portland Building Reconstruction team providing support in the analysis of the existing building conditions and development of technical solutions for the building envelope.

The following report represents a summary of the Portland Building's envelope issues and probable root causes. In addition, it provides overview of the proposed rainscreen solution and technical justification for this approach. As part of this documentation, a brief summary of other solutions and systems considered as well as why they were not deemed feasible or appropriate is included.

facade forensics

fixing skins before and after they're built

facade forensics, inc. 5311 Salem Road *Suite* 100 Cincinnati, Ohio 45230 *p*:513-383-9906 *f*:513-232-0425 *e*:mlewis4@cinci.rr.com

Saturday, 19 November 2016

Ms. Carla J. Weinheimer AIA DBIA, Associate
DLR Group
421 Southwest Sixth Avenue, Suite 1212
Portland, Oregon 97204

Subject: The Portland Building Reconstruction, Portland, Oregon
Diagnosis of Enclosure Problems & Recommended Remedy
FF#1621.0, DLR#74 16113 00

Dear Ms. Weinheimer:

Facade Forensics' assessment of The Portland Building's thirty-year old historic enclosure concluded its problems could not be corrected by restoration-type repairs limited to traditional preservation techniques. Problems caused chronic water infiltration resulting in harmful moisture inside the building and premature deterioration outside. Together, they diminished the building's function, its integrity, and abbreviated its life. Leaks into the inside compromised occupants' comfort and led to ongoing interior maintenance problems; water within walls generated staining, efflorescence, cracks, and corrosion. On the exterior, water penetration into the wall degraded some of the mortar attaching the tile to the concrete wall. Reversing the decline of The Portland Building's condition, plus upgrading its serviceability and extending its useful life require a long-term remedy for leaks and degradation beyond the capabilities of in-kind preservation. Decades of those attempts failed to provide a permanent solution. Since construction finished in 1982, repeated attempts to fix problems by careful repairs that preserved the original materials did not stop leaks or prevent re-occurring symptoms. The repairs sometimes scarred the building's original appearance, yet leaks re-occurred, and degradation spread. Repeating failures proved continual short-term repairs that mitigated *symptoms* of problems cannot fix the *problems* in the building's flawed enclosure. Problems, or sources of moisture, and resulting degradation originate in the building's construction and the industry's not yet developed understanding of enclosure science at that time. Careful consideration of the existing enclosure details and structural concrete elements comprising the existing enclosure revealed that removing and replacing or restoring windows, sealants, grout, tile and flashing, as is common in a traditional preservation approach, would not remedy the fundamental enclosure problems. The only viable way to provide a long-term remedy for The Portland Building's enclosure is to add a rainscreen system over the existing facade. The rainscreen shall replicate the existing enclosure's finishes, planar relationships, and joint patterns as closely as possible; this preserves the design intent of the original enclosure while correcting its inherent functional flaws.

Past re-caulking, repointing, recoating, retiling, re-patching, re-glazing, and re-gasketing to try to restore the facade's original fabric failed to fix its problems. Usually the past work only slowed symptoms short-term. Repeating those repairs in the future, more frequently as deterioration worsens, cannot change outcomes because The Portland Building is not built like, and does not behave like, century-old masonry buildings where those type repairs work. Refined over more than twenty centuries, the technology of old load-bearing masonry enclosures minimize leaks into interior spaces by absorbing and holding moisture, like a *reservoir*, until drying by breathing the moisture back out. Periodic restoration by traditional techniques like repointing and selectively replacing parts effectively preserve those types of masonry buildings and their weathering mechanisms by restoring their reservoir and its watershedding features. The Portland Building is not a masonry building; it has an exposed reinforced concrete enclosure with tile attached to it in some areas. Its construction lacks watershedding details prevalent on many historic masonry buildings. Its enclosure technology, young at perhaps sixty years old in 1980, was still evolving, for concrete does not resist weathering well. It cannot be a reservoir because absorbed moisture induces corrosion and carbonation that destroy it; so concrete must be a *barrier*. The post-modern building's dense, but relatively thin concrete walls cannot resist water and thermal penetration by acting as reservoirs like old buildings' thick, porous masonry walls are able to act as reservoirs. The Portland Building relied on its paint, grout between tiles, and caulk in joints to be a barrier against water intrusion and absorption, but they are by nature only temporary. Screening the concrete to shed water, relieve wind pressure, and moderate temperatures is the only approach that will successfully prevent degradation outside, leaks inside, and provide appropriate interior comfort.

How the Rainscreen Remedies Enclosure Problems Long-Term

The rainscreen concept is the correct enclosure remedy for the The Portland Building. It remedies enclosure problems by closing gaps in barriers and shielding existing air, water, and thermal leak locations in the existing enclosure from exposure to weather. The proven rainscreen concept needed to be adapted to The Portland Building's architecture to respond to its landmark status. This remedy for the building's enclosure applies new, mixed cladding systems over the original facade, to replicate the original appearance. It corrects original problems, improves performance to modern standards, and will require little maintenance. The new high-performance rainscreen enclosure will protect the building and its occupants from the elements while significantly improving the energy performance of the building. New factory-glazed, thermally-broken unitized windows and curtainwall shall replace the dilapidated glass systems. Setbacks and all relationships to reveals and mullions are kept consistent with the facade's design. The proposed rainscreen enclosure is comprised of insulation that covers all surfaces, panels covering the existing painted concrete and glazed terracotta covering the existing tile. Pressure equalization engineered within the new system effectively diverts air and water away from joints so they remain dry, and thus cannot leak. The insulation fully wrapping the building's outside behind the exterior covering warms walls in winter and keeps them cool in summer, stabilizing interior surface temperatures so occupants are comfortable and mechanical performance is improved. The new continuous insulation wrap also alleviates condensation, eliminates bridges, and abates lost energy. No repair-and-replace in-kind option that exposes the existing tile and concrete can achieve these critical building performance features required by current Building Energy Code and LEED.

The proposed rainscreen replicates The Portland Building's original exterior surfaces, before damage evident today, without replicating the enclosure's existing functional problems. The rainscreen solution accomplishes these objectives for all three existing primary enclosure systems:

1. *at openings:* Glass-filled aluminum frames copy the original frames' sightlines, mullion arrangements and colors. Better light-transmitting and solar qualities of new glass, maximizing existing vision glass openings, and changing some spandrel glass to vision glass will improve daylighting and cut heat gain without conspicuously altering exterior appearance. High-performance kynar extrusion coatings resist weathering better than original anodizing.
2. *at paint on concrete:* Aluminum plate panels formed with reveals painted to match the concrete's coating copy the original concrete's painted face, its reveal size, shapes, patterns and alignments. Fabricated and finished in a factory, the custom panels' baked-on kynar finish is a proven, stable, and low maintenance finish. Its color characteristics would be warranted not to change for decades. The multiple-coat kynar would replace the existing building's elastomeric paint.
3. *at tile on concrete:* The rainscreen design uses two different strategies for replicating the red tiles in the tower's keystones and green tiles at the base. To reduce weight and future maintenance requirements where red tiles are placed high on the tower, aluminum plate panels with applied aluminum red tiles, constructed almost identically to the panels covering the painted concrete, replicate the original clay tile and grout's original patterns, color, texture and relative scale. Relief, or depth of joint from tile face, increases slightly from existing to enable permanent concealed mechanical connections. Kynar finishes on aluminum panels and aluminum tiles, chemically identical to the kynar on panels over concrete, duplicate those panels' durability for decades.

   To replicate the existing green clay tile glazed hard surface at the lower three levels, new glazed terracotta green tiles will mount onto concealed custom aluminum frames, without using mortar. Mechanically mounting the tiles to a hidden backup frame instead of adhering them with mortar eliminates risk of chronic problems occurring with the existing building's adhered tile veneer. Separation, delamination, efflorescence, discoloration or displacement occur at multiple locations within the existing adhered tile veneer's grout joints and setting bed. Replacing grout with hard silicone in joints may slightly alter the

joints' surface texture, but the variance is likely indistinguishable from the existing at more than arm's-length. The silicone will, however, replicate the grout's profile, sustain the intended black color several decades after the grout would fade to light gray, and resist fungal growth. As existing conditions prove, grout fades from black in only a few seasons, then eventually develops efflorescence and in some areas, moss. The system will be continued above the sidewalk and loggia through the third floor so appearance is consistent. Thorough pre-engineering of the new tile layout will correct unwanted wide joints and cut tile anomalies scattered in the existing facade. Anomalies resulted from the underlying concrete's as-built dimensions not matching the tile's module. Glaze texture, color, and hardness on terracotta should physically and aesthetically perfectly match the existing clay tiles.

Repairs Unable to Remedy Enclosure Problems

Evaluation of many combinations of more traditional restoration-type repairs for The Portland Building's enclosure revealed all either failed to remedy its known sources of moisture, or their methods compromised conformance to current energy codes and standards. Interiors must be kept dry, and City energy policies require conformance to these codes and standards. Project goals also require the enclosure reconstruction to improve interior daylighting, not only intensity, but dispersion, and also improve views to the outside. Key criteria for judging potential remedy options include: 1.continuity of air, water, vapor and thermal barriers to stop leaks and moisture long-term, 2.expansion of existing openings without cutting concrete to improve daylighting and views, 3.simplifying transitions between systems to reduce risk of future problems, and 4.reducing, if not virtually eliminating, maintenance beyond glass cleaning. Following are summaries of repair options that did not successfully achieve necessary objectives, listed by existing enclosure system:

1. *at openings:* Facade Forensics recommends removal of existing storefront-type windows and stick-built multiple story curtainwall framing systems infilled with dark-tinted, un-insulated glass, and replacing them with new unitized curtainwall. Other repairs considered, but failing to satisfy requirements include:
   - replacing monolithic glass with new insulated glass in the existing aluminum frames requires re-working aluminum frames, adding visible adapters, and inheriting the existing frames' poor performance.
   - attaching adapters to existing frames to accept new insulated glass, even if visually acceptable, inherits the existing frames' limited structural capacity.
   - attaching adapters to existing frames also inherits faulty floor splices and perimeter joints to concrete that depend only on exposed sealant to prevent air leakage and water penetration; these continually fail.
   - keeping existing frames also keeps their perimeter seals, perpetuating reliance on exposed, field-placed sealants to resist leaks, and need to inspect them, find defects, and repair breaches at least annually.
   - expanding daylight openings vertically in existing curtainwalls would require reworking existing mullions and adding new horizontal mullions into an extinct framing system, increasing vulnerability to leaks.
   - keeping the existing aluminum frames eliminates the opportunity for making curtainwall and window daylight openings wider, and window daylight openings taller to increase opening sizes, light, and views.
   - keeping existing aluminum frames requires verifying capacity of all connections subjected to leaks or distress, and possible reinforcement; these extensive investigations and corrections cost more than new.
   - keeping the frames also prevents return of existing insulation on the interior side of concrete walls, into and around perimeters of the concrete openings to close existing gaps in insulation to the frames.

2. *at paint on concrete:* Facade Forensics recommends keeping the paint on concrete, removing its spalls and unsound areas, insulating over the outside, and covering with a rainscreen of painted aluminum panels that look like the painted concrete they cover. The new unitized curtainwall system is a separate weather barrier, so it negates the need for a barrier on the concrete, or to restore concrete surface integrity as the barrier's substrate. Repairs considered, but failing to satisfy requirements in the paint on concrete areas include:
   - keeping the insulation on the interior side of the concrete causes the concrete's temperature to nearly equal outside temperatures; the concrete's mass holds the temperature differentials to the interior.
   - keeping insulation on the interior, between studs, prevents the thermal continuity required by current Building Code and LEED certification.
   - changing interior-side insulation to spray-on closed cell polyurethane would require new interior finishes at all exterior walls and steel stud framing to support that wallboard.

APPENDIX A

- keeping insulation on the interior side of the concrete so the existing painted surface may be preserved, and attempting to connect that insulation to the windows' and curtainwalls' aluminum frames to comply with Code, would either reduce opening sizes or require extensive cutting of concrete.
- keeping insulation on the interior side of the concrete prevents its continuity through the floors, causing continuous thermal bridges directly to the exterior around the entire perimeter of every floor.
- keeping insulation on the interior side of the concrete makes the wall concrete cold in winter, causing condensation inside when surfaces descend below dewpoint; this moisture risks mold growth.
- cold exterior wall concrete during winter will extract heat from the floor slabs' edges where they connect, chilling those floors and ceilings, requiring more heating, and causing cold feet in edge offices.
- keeping insulation on the interior side of the concrete subjects the exposed concrete to maximum thermal ranges, cycles and stress, promulgating cracks that absorb water into the wall.
- keeping the paint on the concrete exposed requires the applied coating to function as a barrier while under direct exposure to all weathering elements in their full extremes.
- all coatings rely on continuous adhesion to their substrate to maintain their integrity; all coatings require frequent maintenance to sustain their continuity and protect their substrate.
- to function as a barrier, the coating must bridge over existing cracks in concrete, and cracks that form after its application and cure until re-application or repair.
- distress and moisture in concrete, more than a coating's chemical deficiencies, cause coatings to fail; exterior surfaces can rarely be perfectly dried or cleaned before coating, or fully protected while curing.
- preventing penetration through the barrier coating requires repeated re-application, thus repeated access to the building's facade to accomplish the maintenance.
- repeated access to restore the barrier components risks damaging and defacing the coating.

3. *at tile on concrete:* consistent with our recommendation for painted concrete areas, Facade Forensics recommends keeping the tile on concrete, its grout in joints and bed mortar where sound, removing its loose areas, insulating over the outside, and covering with a rainscreen of either red aluminum tiles on panels at the keystones high on the tower, or green glazed terracotta tiles at the base, that look like the tiles they cover. The new unitized curtainwall system is a separate weather barrier, so it negates the need to try to create a barrier on, or beneath, the existing tile, or even to restore concrete surface integrity as the adhered tile or barrier's substrate. Because existing tile-faced walls are concrete underneath, identical to the concrete under the paint, all repairs listed ineffective there are also not effective in this area. Repairs considered to address the tile, grout, and bed on the concrete, but failing to satisfy requirements include:
   - replacing loose or damaged tiles in-kind does not resist water absorption around tiles, into the wall.
   - replacing loose or missing grout in joints between tiles does not resist water absorption into the wall.
   - replacing delaminated or corroded lath and fractured bed mortar under tiles and joints does not resist water absorption into the wall or continued propagation of damage.
   - applying a clear sealer to the joints reduces absorption into the grout, if sound, but does not bridge cracks or seams, thus does not stop water absorption into the wall drawn in by capillary tension.
   - applying an opaque elastomeric coating over grout in joints to bridge cracks would expand the problems experienced at paint on concrete, and further, would need to lap onto tile faces to seal seams.
   - failing to prevent water absorption would perpetuate efflorescence and staining.
   - failing to prevent water absorption would propagate corrosion of embedded lath, and rust staining.
   - aluminum frames' perimeter seals to porous grout in joints between tile fail to prevent leaks through the tile joints, around sealant edges even when sealant is properly bonded.
   - preventing water absorption into the walls would require removing all tile, grout, and bed mortar to apply the barrier beneath the adhered tile system.
   - the barrier between concrete and tiles would inherently inhibit bond of setting bed to supporting wall.
   - potential of trapping absorbed water at barrier layer would require a drainage plane to evacuate water.
   - adding a drainage plane between wall and tile system completely separates tile from its support, ideally creating a narrow air cavity, thus requiring independent support of the tile in front of cavity and wall.

- connecting aluminum frames' perimeters to the barrier under the tile would require adding continuous flexible flashing to bridge the gap between them, so air, water vapor, cold and hot do not transfer.
- re-installation of new, duplicate tiles using mortar bed and grout repeats efflorescence problems.
- too many tiles would be broken or damaged during removal to consider reclaiming for re-installation.
- time and labor to attempt to remove and re-install adhered tile would be wasted, and repeat problems.
- noise and dust generated by removal could not be contained within project site even with netting, curtains and diapers encapsulating scaffolds, affecting properties and public beyond site borders.
- restoring existing tile would postpone enclosures at those openings, delaying start of subsequent trades.
- restoration of existing tile could not begin until new, custom replacement tile could be produced.

Performance Benefits of Rainscreen as a Remedy

The recommended rainscreen solution can be built using a proven unitized curtainwall system. The system would erect individual interlocking, finished wall sections just outside the existing wall surface; each section, or *unit,* one floor tall and varying between approximately two and ten feet wide. Units are fabricated and assembled from aluminum mullions, plates, glass, insulation, sealants and gaskets indoors in an off-site shop by specially-trained crews. In an assembly-line process, units are built laying flat, outside-face up, with hands-on quality-assurance inspections verifying each step to reduce risk of future problems. Work done off-site is replaced by other trades on-site, promoting faster progress and an earlier overall finish. It is not unreasonable to expect enclosure of a floor in a week. Enclosing each floor earlier starts subsequent interior trades sooner.

Contemporary unitized systems are commonly engineered to resist *all* water leaks when two inches of rain fall in only a quarter-hour, with sustained 70mph winds. Air leakage can be limited to one cfm for every 20sf of wall during sustained 50mph winds. Actual, effective R-25 can be exceeded in non-vision glass areas by eliminating thermal bridging, resulting in resistance to condensation when outdoor temperatures descend to near zero, even with indoor climates kept to 30%RH. Such combined performance was rare ten years ago. Units are engineered with their primary seals and gaskets concealed within interlocking parts, thus not exposed to weathering, so they are maintenance-free and their performance virtually does not diminish over time. High performance, redundancy, quick erection and longevity justify unitized enclosure's premium expense and added wall depth. Every unit requires its own aluminum mullions and frames to span a full floor height, their depth dictated by structural loading. This framing is redundant because it bypasses the structural concrete wall doing the same work now. Claddings and offsets in claddings add onto the outside of this mullion depth; some setbacks may be shallower than existing to avoid exacerbating the overall wall depth. On the inside of the frame, space is needed between new wall units and the existing tile or concrete to enable the units' structural connections to the building and reasonable access to them during construction. At setback tower walls, the new units may push the face-of-wall ten or more inches outward from the existing walls' faces. This depth causes window surrounds to approach eighteen inches from inside the existing concrete to face-of-new glass. Existing interior window surrounds are typically eight inches deep, with windows inset five inches into their concrete openings. The new deep return might be used to disperse natural light further towards the core. Enlarging the glass openings and changing existing dark-tinted glass to clear glass allows more daylight into the openings. Depth can be reduced at base walls that start at the ground to avoid encroaching the sidewalk by only partially-unitizing the new rainscreen, a feasible approach at low walls.

Replacing glass systems and covering the facade with a rainscreen formed by a unitized curtainwall is the only long-term remedy for The Portland Building's enclosure problems. The solution replicates the facade's historic appearance, improves quality of interior workspaces, and cuts energy loss to extend the building's life many decades.

Sincerely,
Facade Forensics, Inc.

Michael D. Lewis, AIA NCARB FASTM MEng

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THE PORTLAND BUILDING
RECONSTRUCTION PROJECT