# Peter Meijer Architect, PC

July 3rd, 2017

Hillary Adam
Bureau of Development Services
1900 SW 4th Avenue, Suite 5000
Portland, Oregon 97201

Comments on Portland Building – LU 17-153413 HRM AD

Dear Ms. Adam and members of the Portland Historic Landmarks Commission,

Please find attached additional materials pertaining to our argument against covering over the historic Portland Building in a metal façade. Attachments include:

1. Michael Grave's Portland Tribune interview from 2014 regarding **materiality** and the future of the Portland Building. Mr. Grave's specifically comments on metal screen façades as "monstrous."

   > "When it comes to materials, he sticks to what he knows: glass, stone and wood. He intensely dislikes the yellow, perforated, metal screen wall on the front of the hotel he's staying in. *'You can't see in and you can't see out. What's it for? I see it in magazines every day, they don't make façades any more, they make screen walls. It's monstrous, it's a fad.'"*
   >
   > Joseph Gallivan, "Startchitect on his Portland Building: It's a pig pen in there," Portland Tribune, October 09, 2014, "http://portlandtribune.com/pt/9-news/236570-102193-startchitect-on-his-portland-building-its-a-pig-pen-in-there-" [accessed June 28, 2017]

2. Two third-party cost estimates for proposed exterior façade vs renovation of façade.
3. Daylight study by Peter Meijer Architect, PC (PMA) showing the proposed project **does not** meet the proposed: *Project Goals & Values, 4. Quality workplaces c. Improved lighting including increased access to daylight. [D3 No. 06-2016 Phase 1 Report Acceptance]*
4. PBOT denial letter to Peter Meijer Architect, PC (PMA) regarding encroachment (an example of PBOT's normal stringent standards).

   > Disregarding the City's own Code Section 3202, the project is requesting an encroachment on the public realm. A request by a private developer to encroach on the public realm is routinely and emphatically denied. Why is it OK for this project to request an encroachment when City property should be held at least to the same bar, if not higher?

5. *2013 FFA Architecture + Interiors Exterior Envelope Restoration Structure Improvements Assessment Phase 1*. FFA provided the City two repair options for the Portland Building.

There is a way to make the Portland building work. But in its current form, what is being proposed by the design team, with City support, is a building that will fall far short of the City project goals, not improve key interior environments, and cause the potential loss of the most prominent example of post-modern architecture in the United States.

Sincerely,

Peter Meijer, AIA, NCARB / Principal

# Startchitect on his Portland Building: It's a pig pen in there

Joseph Gallivan Thursday, October 09, 2014

3 Comments

Michael Graves thinks the building can be saved for $40 million, not $90 million

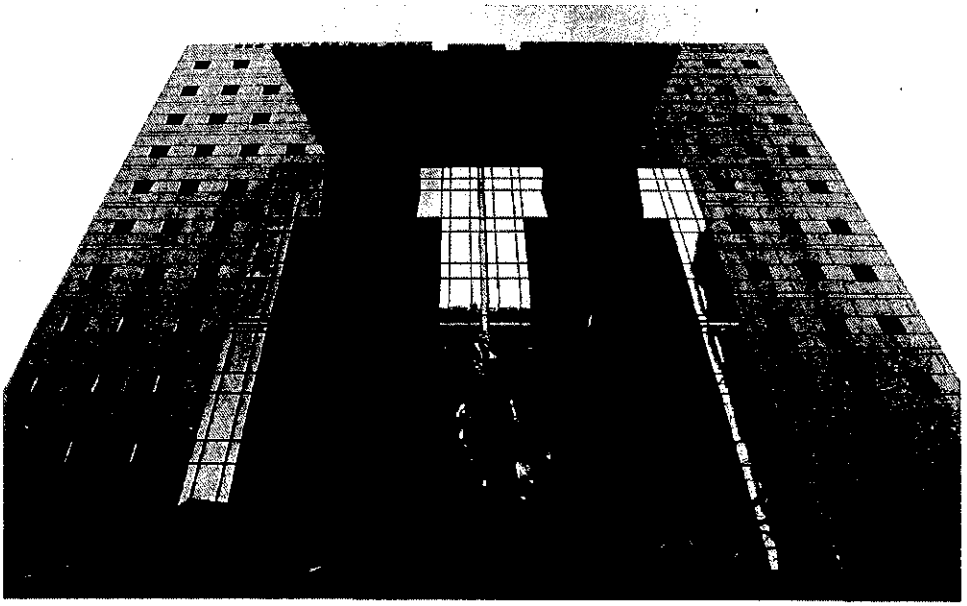

Photo Credit: TRIBUNE FILE PHOTO - Architect Michael Graves, who designed the Portland Building in the 1980s, says estimates to save the building are flawed. The Portland Building is a national historic site and the focus of criticism from architects and the public.

Architect Michael Graves, the man who launched post-modernism with the salmon and turquoise Portland Building in 1982, has a few choice words for those who don't want to save the building.

"I heard this morning that it would cost $90 million to fix it. That's bulls--t. It's all the newspapers and people who don't want to fix it, like

the city administrators who don't want to deal with it any more," he said, sitting in his wheelchair in a conference room at the Residence Inn in the Pearl District.

"I built that building for $24 million, and now they're going to fix it for $90 million, not $40 million. They made it up."

The Portland Building is both a tourist attraction and a working building, filled with city offices, for parking, the parks department etc. It has been criticized for being too dark and leaky inside.

The Tribune asked Graves what he thought about those who say it should be torn down and replaced.

"Where are the going to get the money to build a new one? It'll cost gobs of money. They're not going to rip it down now, that's for sure. I got that from the horse's mouth, I'm not making that up."

He wouldn't say which talking horse, but Graves did add that he has no say in what should be done.

"None whatsoever. I'm here for a couple of days. I came out here to make sure my voice was heard. I don't get paid for coming out here and speaking for two days."

The University of Oregon School of Architecture invited Graves to Portland to speak as part of Design Week.

What he does advise is they turn the colored glass to clear to let more light in, and add glass to the loggia and bring in retail.

"And clean out the lobby, make it a great deal smarter than it is now. It's a pig pen in there now."

He points out that he designed it in an energy crisis and he did as told: use small, tinted windows to keep the heat in.

"That helped me win [the competition]. I got points for that."

And this was all before LEED or Leadership in Energy and Environmental Design, a set of rating systems for the design, construction, operation, and maintenance of green buildings.

"Well, LEED's bullls--t."

Is it novel that his famous Portland Building elicits strong feeling, pro and anti?

"All my buildings elicit strong feelings. I have more people that like my buildings, or I wouldn't be practicing today."

Is the controversy fun?

"Oh, it's a joy," he said with irony.

There is a retrospective at the Grounds for Sculpture in New Jersey opening this month to celebrate 50 years of his firm's practice.

"That's pretty exciting, there are things in there I haven't seen since 1960, models and drawings."

Graves also had a show of paintings open on Monday, Oct. 6 at the Studio Vendome Gallery in New York City.

What sort of art crowd comes to see his paintings? He doesn't know, because he only knew two or three people there.

Does he have any secret projects underway?

"Someone asked me to a do a tree house the other day. I can't afford to spend much time on something like that, but I would do it and it would be pretty interesting. I already have some ideas. I'm thinking about what's possible to build for $5,000 or $3,000. I don't know what their budget is yet."

Graves designed from immediate need — all the furniture when he was a young married man in his first apartment, gaily colored housewares sold in Target and JC Penny, and hand rails and ice cream scoops suitable for disabled people after a virus paralyzed him.

He points out that after World War Two architects were so busy they just did the outsides of buildings. "They gave away the interiors, the carpets and chairs."

He is now doing the master plan of a university in China, including the school of architecture. "I'm doing everything," he says proudly.

Graves says he's very negative about current architecture. What does he think of the concrete towers of Shanghai?

"Shanghai, all that was rice fields, it was beautiful, and now it's just garbage. All that stuff, architects trying to make names for themselves doing weird things."

When it comes to materials, he sticks to what he knows: glass, stone and wood. He intensely dislikes the yellow, perforated, metal screen wall on the front of the hotel he's staying in.

"You can't see in and you can't see out. What's it for? I see it in magazines every day, they don't make facades any more, they make screen walls. It's monstrous, it's a fad."

As for the Portland Building, he knows it's a tourist attraction but is convinced it will remain a working building.

"They're now proposing they build a new city hall. The old city hall, my building and the county courthouse will be the offices, and the new city hall can be smaller.

"That's a real proposal. I heard it from the horse."

From ArchDaily.com:

The Portland Building, by architect and product designer Michael Graves, is considered the first major built work of Postmodernist architecture. The design, which displays numerous symbolic elements on its monumental facades, stands in purposeful contrast to the functional Modernist architecture that was dominant at the time. As Graves explains of his architecture: it's "a symbolic gesture, an attempt to re-establish a language of architecture and values that are not a part of modernist homogeneity."

www.archdaily.com/407522/ad-classics-the-portland-building-michael-graves/ (http://www.archdaily.com/407522/ad-classics-the-portland-building-michael-graves/)

Comments for this thread are now closed.

**3 Comments** Pamplin Media Login

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**Paul Cone** • 3 years ago

He's right about LEED, but he doesn't have to work in this building. He should stick with designing toasters for JCPenney.

2 ^ v • Share ›

**Dave Lister** • 3 years ago

"Well, LEED's bullls--t."

Right from the horse's mouth.

2 ^ v • Share ›

**nativepdx** • 3 years ago

The Portland building is a great example of why politicians should not be picking building designs. I have never know anyone wanting to see the building, only the statue.

1 ^ v • Share ›

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# Two Independent Third Party Cost Estimates

**COST ESTIMATE NUMBER ONE**

Following are ROM numbers.

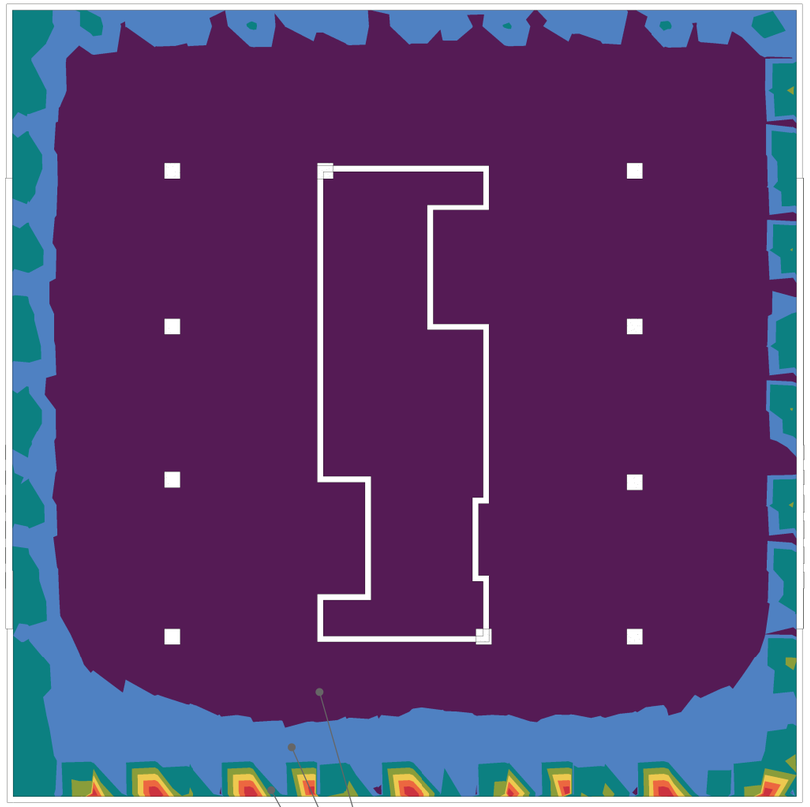
| | |
|---|---|
| Total Vertical Building Envelope | 134,000 SF |
| New metal skin with substructure modifications<br>*(project currently proposed)* | $12,100,000 |
| Renovation<br>*(per PMA details)* | $5,700,000 |
| Cost Difference | **$6,400,000** |

**COST ESTIMATE NUMBER TWO**

The primary risk area with the Portland Building is in securing/remediating the existing surface to receive the finish. The next is knowing for sure that it won't leak anytime soon. That said, as we reviewed your systems comparative to the schematics provided in the Report. Yours are far more detailed that those in the Report. Your flashing and backer rod details are clear and these elements can only be inferred in the Report document. As well, the PMA design appears to be a far more efficient system conserving labor and some materials expense. System to system, we believe there is a potential for an overall 10% savings.

A report in December of 2016 by the Portland City Auditor stated that the exterior enclosure cost would cost approximately $13.7M. That places the estimated cost per SF to be approximately $89/SF if our calculations of the exterior enclosure are correct at 158,000 SF. In simple terms, your system could offer the project approximate $9 per SF or $1.42M. This type of savings warrants further evaluation for consideration.

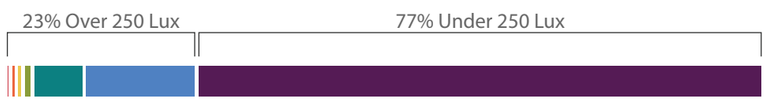
## Existing Conditions
Level 11



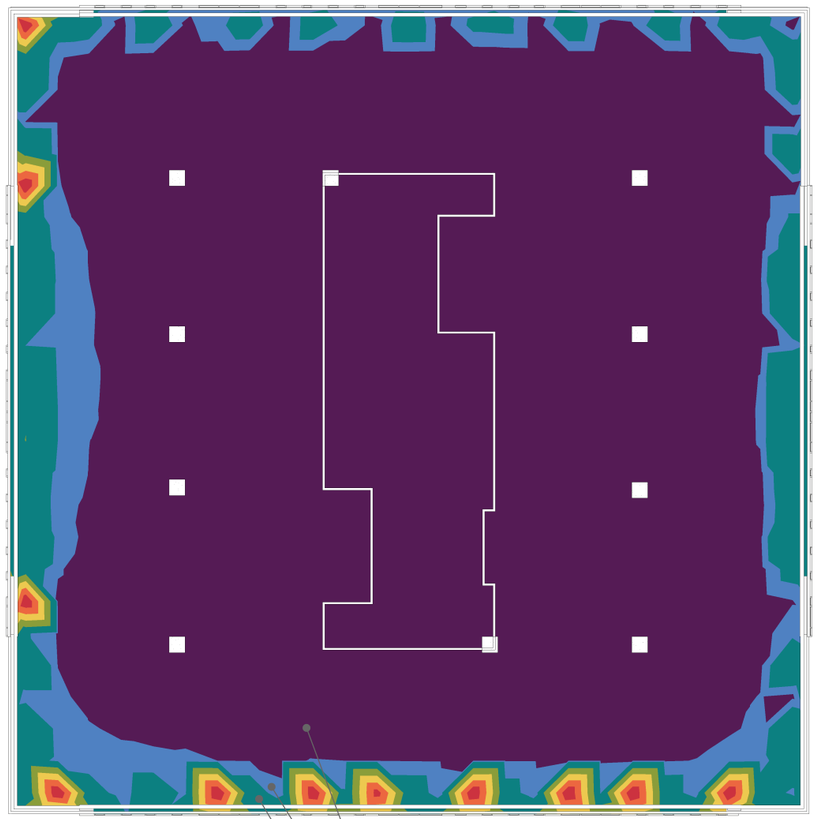
Inadequate Daylight for All Office Work

Adequate Daylight for Non Strenuous Office Activities

Adequate Daylight for General Office Activities



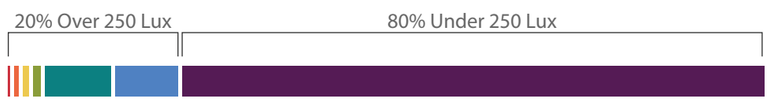

## Proposed Conditions
Level 11



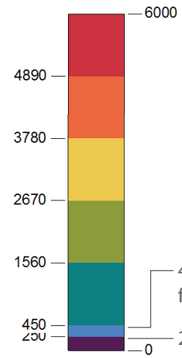
Inadequate Daylight for All Office Work

Adequate Daylight for Non Strenuous Office Activities

Adequate Daylight for General Office Activities




## Illumination Levels (Lux)
*September 21, at 3pm*




450 - 500 lux recommended for office work

250 lux recommended for non-intensive office activities and classrooms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# Portland Building

*Preliminary Daylighting Study*

## Kate Kearney

**From:** Kate Kearney
**Sent:** Thursday, June 29, 2017 10:07 AM
**To:** Kate Kearney
**Subject:** FW: 1657 SE Tacoma Encroachment Permit Application

---

**From:** Castillo, Fernando [mailto:Fernando.Castillo@portlandoregon.gov]
**Sent:** Friday, January 27, 2017 10:47 AM
**To:** Hali Knight
**Subject:** RE: 1657 SE Tacoma Encroachment Permit Application

This was clearly my mistake. When I received the application I was confused because it asked for a new door installation, when it comes to new or remodel of entry ways PBOT requires doors to swing in or modify the entry to have the door swing outward but placed back from the property line. From the phone conversation I took this as an existing door that has always been swinging into the ROW. I also was told that this was an existing doorway but it was built without permits. If PBOT would have reviewed the building permit PBOT would have asked the door to be recessed to clear the ROW. After speaking with my Supervisor, he said that PBOT will not allow this door to swing out into the ROW at this location.

Regards,

Fernando Castillo
Engineer Technician
Bureau of Transportation
Development Review
1900 SW 4th Ave Suite 5000
Portland, OR 97201
503-823-5579



**From:** Hali Knight [mailto:HaliK@pmapdx.com]
**Sent:** Friday, January 27, 2017 10:06 AM
**To:** Castillo, Fernando <Fernando.Castillo@portlandoregon.gov>
**Subject:** RE: 1657 SE Tacoma Encroachment Permit Application

Fernando,
When we spoke over the phone months ago, this door swing was allowed if less than a foot into the ROW. I am confused why the allowance of this has all of a sudden been rescinded. Can you please provide explanation and method

we can move forward with permitting this door. Would this be approved if we installed bollards on either side of the door and signs placed to guarantee safety of passerbys?
Thank you,

**Hali Knight** | Architect I
halik@pmapdx.com

**Please note our new address**
**Peter Meijer Architect**
605 NE 21st Avenue
Portland, OR 97232

T: 503.517.0283
D: 971.352-3935
www.pmapdx.com




---

**From:** Castillo, Fernando [mailto:Fernando.Castillo@portlandoregon.gov]
**Sent:** Friday, January 27, 2017 9:05 AM
**To:** Hali Knight; Aulwes, Katherine
**Subject:** RE: 1657 SE Tacoma Encroachment Permit Application

Morning,

I put this application in front of the Committee leader. He stated that PBOT will not allow the door to swing into the ROW. That said the application was denied.

Fernando Castillo
Engineer Technician
Bureau of Transportation
Development Review
1900 SW 4th Ave Suite 5000
Portland, OR 97201
503-823-5579

**From:** Hali Knight [mailto:HaliK@pmapdx.com]
**Sent:** Thursday, January 26, 2017 3:06 PM
**To:** Aulwes, Katherine <Katherine.Aulwes@portlandoregon.gov>
**Cc:** Castillo, Fernando <Fernando.Castillo@portlandoregon.gov>
**Subject:** RE: 1657 SE Tacoma Encroachment Permit Application

Hello Fernando,
I have attached the PDOT permit application I submitted back in November and in the permit description it stated a new door. The door was installed without a permit and the owner was cited with a construction code violation, so the permit application refers to this existing unpermitted door as a new door.
Can you expedite the review of this encroachment permit, as it was submitted serval months ago?
Thank you,

**Hali Knight** | Architect I
halik@pmapdx.com

**Please note our new address**
**Peter Meijer Architect**
605 NE 21st Avenue
Portland, OR 97232

T: 503.517.0283
D: 971.352-3935
www.pmapdx.com

SUSTAINABILITY AT WORK
GOLD CERTIFIED



---

**From:** Aulwes, Katherine [mailto:Katherine.Aulwes@portlandoregon.gov]
**Sent:** Thursday, January 26, 2017 2:06 PM
**To:** Hali Knight
**Cc:** Castillo, Fernando
**Subject:** RE: 1657 SE Tacoma Encroachment Permit Application

Hi Hali,
I spoke with Fernando about this encroachment permit. It was his understanding that this door was an existing permitted door which is why he informed you that the encroachment permit would not be required. As a new door, an encroachment permit is required. The Bureau of Development Services requires an appeal to allow a door to encroach into the public right of way unless PBOT has issues an encroachment permit for that door. My understanding from Fernando is that you will need to apply for the encroachment permit. I have copied Fernando on this, so you can seek additional clarification directly from him.

Thanks,
Kathy Aulwes
Commercial Plans Examiner
Bureau of Development Services, City of Portland
katherine.aulwes@portlandoregon.gov
503.823.7327

**From:** Hali Knight [mailto:HaliK@pmapdx.com]
**Sent:** Thursday, January 26, 2017 1:39 PM
**To:** Aulwes, Katherine <Katherine.Aulwes@portlandoregon.gov>
**Subject:** FW: 1657 SE Tacoma Encroachment Permit Application

Kathy,
See below response from PDOT regarding encroachment permit.
Thank you

**Hali Knight** | Architect I
halik@pmapdx.com

**Please note our new address**
**Peter Meijer Architect**
605 NE 21st Avenue
Portland, OR 97232

T: 503.517.0283
D: 971.352-3935
www.pmapdx.com




---

**From:** Encroachments [mailto:encroachments@portlandoregon.gov]
**Sent:** Thursday, November 17, 2016 11:42 AM
**To:** Hali Knight; Encroachments
**Subject:** RE: 1657 SE Tacoma Encroachment Permit Application

PBOT will not require an encroachment permit for the door swing.

Fernando Castillo
Engineer Technician
Bureau of Transportation
Development Review
1900 SW 4th Ave Suite 5000
Portland, OR 97201
503-823-5579

*The City of Portland complies with all non-discrimination, Civil Rights laws including Civil Rights Title VI and ADA Title II. To help ensure equal access to City programs, services and activities, the City of Portland will reasonably modify policies/procedures and provide auxiliary aids/services to persons with disabilities. Call 503-823-5185, TTY 503-823-6868 or Oregon Relay Service: 711 with such requests, or visit http://bit.ly/13EWaCg*

**From:** Hali Knight [mailto:HaliK@pmapdx.com]
**Sent:** Thursday, November 03, 2016 10:47 AM

**To:** Encroachments <encroachments@portlandoregon.gov>
**Subject:** 1657 SE Tacoma Encroachment Permit Application

Find encroachment application attached.
Please confirm received submittal.
Thank you,

**Hali Knight** | Architect I
halik@pmapdx.com

**Please note our new address**
**Peter Meijer Architect**
605 NE 21st Avenue
Portland, OR 97232

T: 503.517.0283
D: 971.352-3935
www.pmapdx.com

FFA Architecture + Interiors

# The
# Portland Building

# Exterior Envelope Restoration
# Structure Improvements
# Assessment Phase 1

**Contract #**
**30002867**

FFA Architecture and Interiors, Inc. | 520 SW Yamhill Suite 900 Portland OR 97204 | T 503.222.1661 F 503.222.1701 | www.ffadesign.com

# Assessment

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# *Executive Summary*

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# Executive Summary

## ***Introduction***

Construction of the Portland Building was completed in 1981, occupying an entire city block in downtown Portland's civic center. A product of a design competition initiated in 1979 to attract the nation's top talent, the fifteen-story 360,000 square foot office building, designed by renowned architect Michael Graves, was the first major Post-Modern expression to be fully realized.

The Post-Modern design movement developed in criticism of post-World War II modernism, but not necessarily opposition to modernism. The Portland Building was a manifestation of this movement and a 'lighting rod' for debate between Modernists and Post-Modernists during the late 1970's and 1980's.

The Portland Building represents a snapshot in architectural design trends, and design philosophies for this time period. Due to its unique and controversial design statement, the Portland Building is considered of "exceptional importance" and qualifies under special consideration for properties that have achieved significance in the past 50 years. The building was officially listed on the National Register of Historic Places in 2011.

The complete National Park Service / National Register of Historic Places Registration form is included in this report.

The Portland Building exterior wall system relies on the outer surface to provide the weather barrier. This is the fundamental design concept for the building. The barrier is intended to stop all water and air from penetrating the wall assembly. When this weather barrier or **single line of defense** is breached, water is in the building. The building's exterior wall assemblies including paint, ceramic tile, curtainwall, windows, and storefront assemblies, were all intended to be part of this barrier.

Since completion, the building's exterior envelope has presented numerous and chronic signs of compromise and failure of the glazing assemblies and ceramic tile resulting in water and air infiltration and damage to interior finishes, mold, and the general discomfort of occupants.

Studies and recommendations date back to the mid-1980's addressing window assembly failures, roof and flashing issues and efflorescence at grout joints. Several maintenance projects over the years have addressed repair of individual materials and components. These have achieved varying degrees of success, but have never fully resolved the overarching systemic issues.

FFA Architecture and Interiors was contracted by the City of Portland in September 2012 to provide a complete assessment of the existing exterior envelope condition. The project goal was to identify and quantify the scope of the ongoing problems with the exterior envelope.

Simultaneous to this, FFA and KPFF Engineers were contracted to provide a complete structural assessment. The structural engineer's scope of work includes development of a computer model of the building based on the original Construction Documents and design criteria, followed by augmentation of the model with actual test results from building core samples and field investigations.

Based on the results of the modeling and testing, FFA and KPFF developed options for the

up grading the building structure to meet current lateral structural design criteria.

Utilizing this information, FFA and the project team developed 'Recommended' repair and upgrade options, and projected construction budget estimates for both the exterior envelope and building structure.

## Approach

### *Exterior Envelope Assessment*

FFA Architecture and Interiors, Inc., partnered with The Façade Group, were selected to conduct the assessment of the Portland Building's exterior envelope – including glazing assemblies, tile assemblies, concrete, and stucco. The roofs and the stucco penthouse have been recently repaired and are not included in this survey.

This assessment is intended to give direction to the design phase of the exterior envelope rehabilitation project. Goals of the project include: addressing water intrusion, reducing air infiltration and increasing energy efficiency at glazing assemblies, and repairing damaged interior finishes, while maintaining the historic appearance of the building. The integrity and longevity of the historic resource and the safety and comfort of its occupants and users are the primary concern of this study.

### *Building Structure Assessment*

The goal of the structural assessment is to evaluate the condition of the existing structure and its anticipated performance during a current code level design seismic event. The assessment identifies specific gravity element and seismic element deficiencies, and it provides recommendations for rehabilitation of those systems. The recommendations are intended to be a conceptual level strengthening program such that they could be used, by a cost estimator or general contractor, to determine probable construction costs for such repairs.

To conduct this assessment, KPFF reviewed available original construction documents and has also performed physical testing and investigation of existing structural elements. Concrete core samples were removed and tested to determine the concrete compressive strength. Reinforcing bar samples were removed and tested to determine the rebar yield and ultimate strength. Based on the original documentation and the testing, KPFF analyzed the gravity system for conformance to the *2010 Oregon Structural Specialty Code* (OSSC), and analyzed the lateral system for conformance to *ASCE 41-06, Seismic Rehabilitation of Existing Buildings*.

## Assessment Methodology

All findings presented in this report are based on the review of documentation provided by the City of Portland and field work performed by the project team.

### Background Research

Prior to conducting the physical assessment, FFA and the project team reviewed the available documentation on previous attempts to address the ongoing problems. Studies and partial repair projects addressed numerous piecemeal repairs carried out over the past 30 years. These documents are identified later in the report and organized chronologically with a brief synopsis of each.

### Exterior Envelope Field Assessment

Field assessments were conducted by two teams – the Façade Group at the exterior and FFA at the interior. The initial field assessment

was conducted by both teams mid-September through mid-November, 2012. Conditions were observed during both dry moderate and cold wet weather.

As a result of the initial assessment, the project team recommended conducting additional invasive investigations of the perimeter walls from the interior to gain further insight into the relationship between interior damage and external conditions.

This interior testing was done in conjunction with the structural assessment testing. The testing package included over 160 test sites located throughout the building. Each test included demolition of the existing interior wall assembly, mapping of existing concrete reinforcing, reinforcement bar samples at selected locations, concrete core samples, and documentation of existing conditions in exterior wall cavities.

Utilizing the background research, building assessments and selected invasive testing, FFA and The Facade Group have been able to thoroughly assess The Portland Building's existing exterior envelope condition. The results then allowed the project team to make recommendations and develop an estimated construction budget.

## ***Condition Assessment:***

Each component assembly on the exterior elevations was assessed for proper product selection, general installed condition, compliance with original design documents and details, performance, remaining life span and historic integrity. The components were separated into the following general categories:

**Glazing Systems**

**'Punched' window openings:**

1'-8" x 1'-8", 4'-0" x 4'-0" and 7'-6" x 7'-6" window assemblies in both concrete and tile walls. Typically these windows show evidence of failure in multiple ways including: perimeter sealant deterioration, frame separation, glazing gasket deterioration, finish corroding and etching from adjacent tile surfaces. Moisture and signs of past moisture intrusion were noted at several test locations.

The single glazed windows with non-thermally broken frames are also extremely energy in-efficient. This often leads to uncomfortably hot or cold conditions in the adjacent interior spaces. Sill temperatures were noted to be 20 to 25 degrees colder then room temperatures during the testing period in January. This temperature differential has also contributed to moisture (condensation) build-up on the interior side of the glazing. The resulting moisture, in turn has led to deterioration of interior finishes and wall materials. At some noted in previous reports and studies the presence of mold spores has been identified.

**Storefront Assemblies:**

Storefront Assemblies at the first level are installed in two configurations: recessed in the loggia and at the face of the exterior wall.

The recessed storefronts are generally in moderately good condition. They do show wear and tear of daily use. In three locations the top anodized aluminum panels are the incorrect color. Door hardware and trim is also showing its age.

The exterior wall storefront assemblies show more evidence of failed glazing gaskets, perimeter sealants, deteriorated joint seals and deteriorated finishes. Efflorescence from adjacent tile has permanently etched the surface of frame and glass of the storefront.

**Curtainwall:**

The curtainwall assemblies are on all four elevations in the 'shaft' portion of the building. Typically extending from the fourth floor to the tenth floor, these assemblies span across multiple floors and are intend to create the vertical column elements in the building design.

The curtainwall assemblies show significant signs of failure and based on past reports and studies, are a constant source of moisture problems.

Poor detailing, incorrect installation, incorrectly installed sealant, lack of sheet metal flashing, and failed thermal expansion joints have all lead to moisture and air intrusion at numerous locations throughout the building.

**Ribbon Windows @ Red Tile Keystones:**

The ribbon windows at the red tile keystones were installed at the eleventh through fourteenth floors using 'storefront' assemblies. Typical 'storefront' assemblies are not intended for installation at this height. They are not designed to resist the wind and weather conditions that are encountered at higher elevations.

The ribbon windows show significant signs of failure. Based on past reports and studies, these windows have been a constant source of moisture problems.

Incorrect product selection, poor detailing, incorrectly installed sealant, lack of sheet metal flashing, and failed thermal expansion joints have all lead to moisture and air intrusion at numerous locations throughout the assembly.

**Tile**

**Red Tile Keystones:**

The red ceramic tile keystones at the east and west elevations from the tenth to fourteenth floor create the column capitol for the curtainwall columns. The keystone is an integral exterior element in the post-modern design concept.

The red ceramic tile on thick-set mortar base is a custom color and size. It was originally made in West Germany and is no longer available in the United States. New custom tile can be manufactured locally to match existing color and size. In general the tile is adhering well to the building. No loose, delaminated of tile was observed in the assessment process.

The installation of the tile has led to significant problems at the ribbon windows. Moisture migration through unprotected tile mortar joints and un-flashed transitions to adjacent materials has caused significant leaks and general deterioration of interior finishes at many locations.

Moisture migration has also carried the salts and minerals from the mortar concrete out through the tile joints. When deposited on the exterior, the salts and minerals crystalize into a white, chalky efflorescence which discolors the base material. Mortar joints which are intended to be dark gray to black are now nearly white in appearance. In normal conditions, efflorescence will eventually wash away, however, constant moisture intrusion has

led to permanent efflorescence etching and staining of adjacent window frames, glass, and ceramic tile.

**Blue-Green Tile at Base:**

The three lower levels or base of the Portland Building are covered with a thick-set blue-green (teal) ceramic tile. The tile is a custom color and size. It was originally made in West Germany and is no longer available in the United States. New custom tile can be manufactured locally to match existing color and size.

This tile has many of the same issues identified in the red keystone tile. While the leaks around adjacent windows have not been as significant, the efflorescence is much more noticeable. Tile has also been damaged and repaired on several occasions with the patch tile not matching or incorrectly placed.

Some mortar joint repair by repointing and sealing has been attempted, with poor results.

**Concrete:**

The Portland Building is primarily a concrete structure. In addition to the structural frame and floor slabs, the exterior walls are also poured concrete. This is an unusual exterior wall material for a building of this height and configuration.

Exposed and painted concrete is the exterior finish for the shaft portion of the building. Both the light beige walls and red solid elements in the "columns" are painted concrete.

In general, the condition of this concrete is good. Only minor cracking and spalling was noted in the exterior assessment.

Physical testing and investigation results for the concrete cores displayed a wide range of concrete compressive strengths, from a low of approximately 2,700 psi up to a high of approximately 8,000 psi. The average of all tested cores generally compared well with the specified concrete compressive strength listed on the design structural drawings of 4,000 psi; however, many cores displayed compressive strength results significantly below 4,000 psi.

**Stucco:**

There are several miscellaneous elements on The Portland Building that have been built out of light weight stucco assemblies. These include projecting column capitols and 14$^{th}$ floor balcony columns on the east and west elevations, the 15$^{th}$ floor wall finish and the 'ribbon / garland' elements on the north and south elevations.

In general the condition of these stucco elements in good. Only minor cracking and spalling was noted in the exterior assessment.

The 'ribbon / garlands' on the north and south elevations will need to be partially removed and reinstalled if the adjacent curtainwall assemblies are replaced.

**Interior Finishes:**

As noted once the **single line of defense** is breached, water is in the building wall assembly. The only path available is into the building.

The interior side of this wall has an air cavity that is typically furred out with metal studs and filled with fiberglass insulation. The interior wall finish is typically gypsum wall board with vinyl wall covering.

Typically the fiberglass insulation should be held back from the inside face of the concrete wall. This gap allows moisture penetrating the wall or condensation to form on the wall and drain away. However, in the Portland Building, the insulation is applied directly to the concrete wall with insulation pins. The fiberglass batt insulation has become damp or in some cases wet with trapped moisture. In this condition it then loses most, if not all, of its insulation capacity. Thermal scans indicate deteriorated insulation quality in many locations.

The interior finish of the exterior wall is typically vinyl wall covering. Over the years the vinyl has been painted. The vinyl wall covering is the interior vapor barrier in the exterior wall system. This barrier was intended to stop interior moisture from migrating through the wall assembly and condensing on the "cold concrete". The vinyl wall covering also seals exterior moisture in the wall cavity. As vapor levels increase, it condenses on colder surfaces. The resulting water saturates the cavity and the wall components are damaged.

These conditions cause the vinyl wall covering to blister and delaminate, gypsum wall board to decompose, and metal framing corrode. These failures create ideal conditions for mold development and growth. The presence of mold has been noted in previous studies and reports at several locations in the building.

**Miscellaneous Observations**:

**Fire Safing:**

At locations where the existing curtainwall assemblies span across floor levels, the building code typically requires gaps between the floor and curtainwall panel to be filled with fire safing or mineral wool. Fire safing was not apparent at the locations observed.

## ***Treatment Recommendations***

A Treatment Recommendation Matrix has been developed and is included in the report. It has three categories of repair options.

**Option A – Required:**

Stabilization and repairs to arrest current water infiltration and/or correct current deficiencies. This category does not address the root causes or represent a long-term solution.

**Option B – Recommended:**

Holistic approach to address systemic deficiencies and failures that have led to chronic water infiltration and deterioration with the intent of addressing root causes and providing long-term results.

**Option C Improvements:**

Upgrades that can be incorporated in addition to Option B with the intent of further improving the quality of the interior environment and/or building efficiency and maintenance.

**Historic Status**

Each of the options proposed address the identified problems, while maintaining the historic integrity of the original Portland Building as built in 1981. Since the Portland Building is individually listed on the National Register of Historic Places, projects affecting the building exterior are subject to local historic design review (as delegated by the State Historic Preservation Office). FFA and the design team will continue to work with the City of

Portland's Historic Design Review Commission regarding this scope of work.

Recommendations in this report are consistent with the Secretary of the Interior's Standards for Rehabilitation.

## ***Summary of Recommendations***

The Portland Building shows signs of infiltration of water and moisture. The deterioration and damage is significant at all levels. Over the years several attempts to address these ongoing problems have been made, with only partial success at best. Without extensive restoration efforts, these ongoing issues will continue to cause further deterioration and damage.

As noted the fundamental design concept for the exterior wall assembly is based on a **single line of defense**. Once this line is breached, water and air have penetrated the building envelope.

The following recommendations are based on establishing an exterior envelope with a **dual line of defense.** Each proposed solution has two layers of water and air barrier. The outer barrier is very similar to the existing systems installation with the exception of added sheet metal flashing at some locations. Between the layers is a zone where building pressures are allowed to equal out. Any water in this zone is allowed to 'weep' back out. The added inner layer is protected from exposure to the constant sun and weather. This layer is intended to stop any residual water and air from entering the building envelope.

**Glazing Systems**

**'Punched' Window Openings:**

The punched windows are extremely inefficient, poorly installed and show numerous signs of ongoing moisture and air infiltration. Proper and permanent repair of the existing assemblies and adjacent exterior and interior surfaces is not possible with the current assemblies.

**Recommendation:**

Remove existing window assemblies and replace with new curtainwall assemblies.

**Storefront Assemblies:**

The existing storefront assemblies are nearing the end of their useful life. The assemblies are inefficient and poorly installed. Storefront sections recessed in the loggia walls, where protected from direct weather conditions, could be repaired to extend the life for several more years. However, exposed storefronts at the face of the building are in poor condition. Proper and permanent repair of the existing assemblies and adjacent exterior and interior surfaces is not possible with the current assemblies.

**Recommendation:**

Remove existing storefront assemblies and replace with new assemblies

**Curtainwall:**

The curtainwall assemblies on all four elevations have failed. These assemblies are extremely inefficient, poorly installed and show numerous signs of ongoing moisture and air infiltration. Proper and permanent repair of the existing assemblies and adjacent exterior and interior surfaces is not possible with the current assemblies.

**Recommendation:**

Remove existing curtainwall assemblies and replace with new assemblies

**Ribbon Windows @ Red Tile Keystones:**

The ribbon windows were installed utilizing storefront type assemblies; this installation has failed. These assemblies are extremely inefficient, poorly installed and show numerous signs of ongoing moisture and air infiltration. Proper and permanent repair of the existing assemblies and adjacent exterior and interior surfaces is not possible with the current assemblies.

**Recommendation:**

Remove existing storefront assemblies and replace with curtainwall new assemblies.

**Ceramic Tile**

**Red tile at Keystones:**

The original tile detailing was not appropriate for the installation environment and relied on regular maintenance including adjacent sealants. The installation has failed, allowing moisture to penetrate the wall assembly and migrate through the wall causing permanent damage to both exterior and interior materials. Proper and permanent repair of the existing assemblies and adjacent exterior and interior surfaces is not possible with the current assemblies.

**Recommendation:**

Remove and replace with new tile on drainage mat

**Blue –green tile at base:**

The tile installation at the lower levels has many of the same problems as the upper level red tile.

Where exposed directly to the weather conditions the tile has become permanently stained with efflorescence. Several tiles are damaged, broken, or have been replaced with incorrect tiles. Mortar joints are failing; previous repair efforts have been only marginally successful.

Tile installed on the recessed loggia walls is in significantly better, almost original condition. This results in a stark comparison between the protected tile and exposed tile. The protected tile should be repaired where damaged then cleaned and the mortar joints sealed.

**Recommendation:**

Remove and replace with new tile at exterior, repair at recessed 'logia' areas.

**Concrete:**

The exterior concrete walls are generally in good condition. Only minor hairline cracking and spalling were noted in the exterior inspection. These should be repaired as noted in the following report.

**Recommendation:**

The exterior elastomeric coating cleaned, primed and repainted.

**Stucco:**

Similar to the concrete, the stucco is in generally good condition. Only minor hairline cracking and spalling were noted in the exterior inspection. These should be repaired as noted in the following report.

**Recommendation:**

The exterior elastomeric coating cleaned, primed and repainted

**Interior Finishes & Features**:

The building exterior wall design is fundamentally flawed. The reliance on the **single line of defense** concept for water and penetration has led to ongoing failures at many locations throughout the building.

Incorrectly detailed and poorly installed exterior assemblies have allowed water and air direct access to the building wall assembly and interior. Water dripping out of window heads, ponding on window sills and damp carpet several feet in from the exterior wall were all noted or observed during the investigation.

Restoring the punched windows, curtainwall and storefronts will require significant amounts of interior finished to be replaced. These exterior wall assemblies also show signs of deteriorated finishes and in reduced thermal performance due to wet insulation and trapped moisture.

**Recommendation:**

Remove gypsum wall board and insulation on interior side of exterior wall and replace.

## ***Structural Recommendations***

Gravity analysis of the existing structure, including only dead and live loads, indicates that it is mostly adequate to resist current code design loads per the 2010 OSSC. Some elements were found to have, by calculation, demand capacity ratios greater than 1.0. None were found to be overstressed by more than 50%. Per Portland Building Regulation, Title 24.15.060, a building shall be deemed a dangerous structure "whenever the stress in any material, member, or portion thereof, due to all dead and live loads, is more than 1.5 times the working stress or stresses allowed in the *Oregon Structural Specialty Code*." Since no gravity elements were found to be overstressed beyond this limit, by definition this building would NOT be categorized as a dangerous structure, and gravity element upgrades would not be required by the local jurisdiction.

Lateral analysis of the existing structure indicates that it does not conform to current seismic code requirements. Due to their relatively large stiffness, the exterior concrete shear walls attract nearly all of the applied seismic lateral load. With minimal reinforcement, the exterior walls are inadequate to resist the applied seismic load, and these walls would experience significant yielding and degradation during a seismic event. Due to their relatively small stiffness, the concrete moment frames would attract very little of the applied seismic load. Without the walls, the concrete moment frames do not have the capacity to effectively resist the applied seismic load. *Portland Building Regulation, Title 24.15.060*, specifically omits seismic resistance in the definition of a dangerous building, and instead references *Title 24.85* for seismic requirements. *Title 24.85* provides triggers for mandatory seismic upgrades, such as an occupancy change that increases the relative hazard classification, occupancy category, or occupant load. None of these occupancy changes are occurring in this building, therefore a mandatory seismic upgrade would not be required by the local jurisdiction.

If a voluntary seismic strengthening program was to be considered for this building, and based on coordination with the design team and the City of Portland, KPFF recommends an added reinforced concrete moment frame to the perimeter of the building. Compared to other reviewed systems, the concrete moment frame would provide several benefits including minimal infrastructure impact, reduce foundation upgrades, reduce seismic loads due to a better performing system, have minimal interior space impact, and the improvements could be done in conjunction with the work on the exterior restoration.

## ***Budget Estimate***

Exterior Envelope Assessment

The following Budget Estimate is for the Exterior Envelope Assessment. This estimate is based on preliminary documents provided to the cost estimator by FFA.

The estimate is for CONSTRUCTION COST only. It does not include PROJECT COST that would be an additional amount.

Typical PROJECT COST include: owner's administration cost, design and engineering fees, permits, temporary relocation of occupants, furniture and equipment relocation, offsite costs, testing and inspection fees, hazardous materials abatement, financing costs, or any other normally associated project development costs.

The CONSTRUCTION COST estimate also includes 3% for inflation based on a spring 2014 construction start date. If the project is delayed, additional inflation at 3% per year should be included.

The Direct Construction Cost Summary has been developed based on two scenarios for repair and restoration of the exterior envelop and the recommended approach for the Structural Upgrade.

- Option A – Required

  Stabilization and repairs to arrest current water infiltration and/or correct current deficiencies. Does not address the root causes or represent a long-term solution.

- Option B – Recommended

  Holistic approach to address systemic deficiencies and failures that have led to chronic water infiltration and deterioration with the intent of addressing root causes and providing long-term results.

- Structural Upgrade

  Added reinforced concrete moment frame to the perimeter of the building.

| | | |
|---|---|---|
| **Exterior Assessment + Rehabilitation S** | *Architectural Cost Consultants, LLC* | Estimate Date: 18-Mar-13 |
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: 18-Mar-13 |
| FFA Architecture + Interiors | Tigard, Oregon 97223-8489 | Print Time: 9:45 AM |
| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: Spring 2014 |

# DIRECT CONSTRUCTION COST SUMMARY

| Component | Area | | $ / SF | Total |
|---|---|---|---|---|
| Option A | 100,085 | sf | $99.08 /sf | $9,916,393 |
| Option B | 100,085 | sf | $126.98 /sf | $12,709,059 |
| Structural Upgrade | 560,000 | sf | $30.04 /sf | $16,820,264 |

***ALTERNATES***

| | | |
|---|---|---|
| 01 \| Aluminum Windows, Operable Units + Upgrade Glass (add to Opt B) | Add ± | 222,691 |
| 02 \| Storefront @ 1st Floor - Upgrade Glass (add to Opt B) | Add ± | 70,752 |
| 03 \| Curtain Wall - Operable Units + Glass Upgrade (add to Opt A & B) | Add ± | 234,202 |
| 04 \| Ribbon Window - Operable Units + Glass Upgrade (add to Opt A & B) | Add ± | 26,781 |
| 05 \| Alternate Five | | 0 |
| 06 \| Alternate Six | | 0 |

The above estimates are for direct construction cost only. They do not include furnishings & equipment, architect and engineer design fees, consultant fees, inspection and testing fees, plan check fees, state sales tax, mold and hazardous material testing and removal, financing costs, nor any other normally associated development costs. (aka owners "soft costs")

The above estimates assume a competitively bid project, with at least three qualified bidders in each of the major sub-trades.

The above estimates assume a construction start date of: **Spring 2014** If the start of construction is delayed beyond the date above, the estimates must be indexed at a rate of 3 to 4% per year compounded.

This is a probable cost estimate based on in-progress documentation provided by the architect. The actual bid documents will vary from this estimate due to document completion, detailing, specification, addendum, etc.. The estimator has no control over the cost or availability of labor, equipment, materials, over market conditions or contractor's method of pricing, contractor's construction logistics and scheduling. This estimate is formulated on the estimators professional judgment and experience. The estimate makes no warranty, expressed or implied, that the quantities, bids or the negotiated cost of the work will not vary from the estimators opinion of probable construction cost.

No work included in the estimate for restoration of Portlandia, work done under separate contract.

Phasing cost allowance is for sequencing the work, i.e. phase 1, east elevation, phase 2, north elevation, etc. CMGC to confirm construction logistics.

| | | |
|---|---|---|
| **Exterior Assessment + Rehabilitation Study** | ***Architectural Cost Consultants, LLC*** | Estimate Date: 18-Mar-13 |
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: 18-Mar-13 |
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| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: Spring 2014 |

| SUMMARY | Option A | | Option B | | Structural Upgrade | | |
|---|---|---|---|---|---|---|---|
| **DIRECT CONSTRUCTION COSTS** | **%** | **$ / sf** | **Cost** | **$ / sf** | **Cost** | **$ / sf** | **Cost** | **Comments** |
| Area | | 100,085 sf | | 100,085 sf | | 560,000 sf | | |
| 01 \| General Requirements | | $16.35 | $1,636,553 | $16.35 | $1,636,553 | $2.27 | $1,270,553 | |
| 02 \| Aluminum Windows @ Punched Openings | | 3.36 | 336,647 | 8.47 | 848,136 | 0.00 | 0 | |
| 03 \| Storefront @ First Floor | | 1.57 | 157,240 | 3.77 | 376,982 | 0.00 | 0 | |
| 04 \| Curtain Wall | | 21.15 | 2,117,246 | 21.15 | 2,117,246 | 0.00 | 0 | |
| 05 \| Ribbon Window Assembly @ Red Tile Keystones | | 2.31 | 230,749 | 2.31 | 230,749 | 0.00 | 0 | |
| 06 \| Tile - Direct Adhered | | 10.13 | 1,013,513 | 14.86 | 1,486,968 | 0.00 | 0 | |
| 07 \| Concrete | | 2.52 | 252,184 | 3.44 | 343,887 | 0.00 | 0 | |
| 08 \| Stucco @ Capitals & Ornamental Medallions | | 0.64 | 64,038 | 0.82 | 82,395 | 0.00 | 0 | |
| 09 \| Interior Finishes | | 3.95 | 394,885 | 8.05 | 805,817 | 0.00 | 0 | |
| 10 \| Louvers | | 0.03 | 2,800 | 0.27 | 26,875 | 0.00 | 0 | |
| 11 \| Exterior Handrails & Guardrails | | 0.07 | 7,290 | 0.07 | 7,290 | 0.00 | 0 | |
| 12 \| Roof & Penthouse Elements | | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | NIC - separate contract |
| 13 \| Concrete Work | | 0.00 | 0 | 0.00 | 0 | 13.81 | 7,735,124 | |
| 14 \| Structural Steel | | 0.00 | 0 | 0.00 | 0 | 0.19 | 108,549 | |
| 15 \| Additional Interior Finishes | | 0.00 | 0 | 0.00 | 0 | 3.36 | 1,882,767 | |
| **SUB-TOTAL** | | **$62.08** | **$6,213,145** | **$79.56** | **$7,962,898** | **$19.64** | **$10,996,993** | |
| Estimating Contingency | 20.00% | 12.42 | 1,242,629 | 15.91 | 1,592,580 | 2.95 | 1,649,549 | |
| Phasing | 5.00% | 3.72 | 372,789 | 4.77 | 477,774 | 1.13 | 632,327 | |
| Index To Construction Start | 3.00% | 2.35 | 234,857 | 3.01 | 300,998 | 0.71 | 398,366 | |
| CM/GC Contingency | 7.50% | 6.04 | 604,756 | 7.74 | 775,069 | 1.83 | 1,025,793 | |
| General Conditions / Insurance / Bond | 10.00% | 8.66 | 866,818 | 11.10 | 1,110,932 | 2.63 | 1,470,303 | |
| General Contractor OH & Profit | 4.00% | 3.81 | 381,400 | 4.88 | 488,810 | 1.16 | 646,933 | |
| **TOTAL DIRECT CONSTRUCTION COST** | | **$99.08** | **$9,916,393** | **$126.98** | **$12,709,059** | **$30.04** | **$16,820,264** | |

# *Introduction*

# *Introduction*

Construction of the Portland Building was completed in 1981, occupying an entire city block in downtown Portland's civic center. A product of a design competition initiated in 1979 to attract the nation's top talent, the fifteen-story 360,000 square foot office building, designed by renowned architect Michael Graves, was the first major Post-Modern expression to be fully realized.

## *Design Concept*

The Post-Modern design movement developed in criticism of post-World War II modernism, but not necessarily opposition to modernism. The Portland Building was a manifestation of this movement and a 'lighting rod' for debate between Modernists and Post-Modernists during the late 1970's and 1980's.

The Portland Building represents a snapshot in architectural design trends, and design philosophies for this time period. Due to its unique and controversial design statement, the Portland Building is considered of "exceptional importance" and qualifies under special consideration for properties that have achieved significance in the past 50 years.

The building is designed in the classical three-part division of base, shaft, and capital.

The base consists of a full-story loggia and two successively shorter steps above, all clad in blue-green square ceramic tile. The loggia level includes general public entries, and public services. The second level is also comprised of public spaces, lobbies, meeting rooms and building services. The third level contains mostly building services. Storage rooms, computer servers and other utilities require little connection to the exterior and are well suited for this level and resulting 1'-8" x 1'-8" punched window openings.

The shaft section consists of four primary architectural elements: reflective blue glass curtainwall, vertical concrete columns painted red and red ceramic tile keystone column capital are set into a field of off white concrete walls with regular punched dark tinted glass window openings.

The shaft extends from the 4th floor level to the 14$^{th}$ floor. These floors contain various public administration offices and departments. Typical floor plans include the building core with enclosed support spaces, an open plan office layouts and some enclosed perimeter offices and conference rooms. The punched windows with dark tinted glass tend to create 'darker' work areas with little connection the exterior.

At the 14$^{th}$ floor, the shaft transitions to the capital, a centered inset balcony is notched out of the keystone on the east and west elevations. The fifteenth floor is set back for the shaft parapet to further clarify this transition. The top most mechanical enclosures step even further back. This final inset level of pale blue stucco, scored into geometric shapes is typically not visible from the street level.

Apart from the lobby spaces, the interiors were designed by local firm Zimmer Gunsul Frasca Partnership. Construction of the project was achieved through one of the first design-build arrangements in the country involving a project management firm, two architects, two contractors, and a structural engineer. While this arrangement was

thought to benefit the City, it is most often cited as resulting in communication problems, process issues, and change orders during construction that were not fully evaluated. Additionally, the project was executed on what was, from the beginning, considered a relatively low budget.

Since completion, the building's exterior envelope has presented numerous and chronic signs of compromise and failure of the exterior wall including, glazing and ceramic tile wall assemblies resulting in water penetration, air infiltration, damage to interior finishes, mold, and the general discomfort of occupants. Studies and recommendations date back to the mid-1980's addressing window assembly failures, roof and flashing issues and efflorescence at ceramic tile grout joints. Several maintenance projects over the years have addressed repair of individual materials/components and have achieved varying degrees of success, but have never fully resolved the overarching systemic issues.

The building was officially listed on the National Register of Historic Places in 2011. It is cited as nationally significant as a notable work by master architect Michael Graves and as an early and influential work of Post-Modern Classicism. Though not yet 50 years old – the standard threshold for eligibility – the Portland Building is identified as "one of the first large-scale manifestations of a new architectural style coming on the heels of the Modern movement." As such, it is considered of "exceptional importance" qualifying under special consideration for properties that have achieved significance in the past 50 years.

The complete National Register of Historic Places, Registration Application is included in the appendix, Item A.

## *Purpose*

FFA Architecture and Interiors was contracted by the City of Portland in September 2012 to provide a complete assessment of existing exterior envelope conditions, and building structural conditions. Utilizing these assessments, FFA was to provide repair and upgrade recommendations, and project construction budget estimates.

**Exterior Envelope Assessment**

FFA Architecture and Interiors, Inc., partnering with The Facade Group, was selected to conduct a comprehensive survey of the Portland Building's exterior envelope – including concrete, ceramic tile, stucco, curtain wall, storefront, and punched window assemblies, but excluding roofs and the stucco penthouse. The findings, analysis and subsequent recommendations are presented in this report along with construction budget cost estimates.

This assessment is intended to give direction to the design phase of the exterior envelope rehabilitation project. Goals of the project include: addressing water intrusion, reducing air infiltration and increasing energy efficiency at glazing assemblies, and repairing damaged interior finishes, while maintaining the historic appearance of the building. The integrity and longevity of the historic resource and the safety and comfort of its occupants and users are the primary concern of this study.

**Building Structure Assessment**

The goal of this structural assessment is to evaluate the condition of the Portland Building's existing structure and its anticipated performance during a current code level design seismic event. The assessment identifies specific gravity element and seismic element deficiencies, and it provides recommendations for rehabilitation of those systems. The recommendations are intended to be a conceptual level strengthening program such that they could be used, by a cost estimator or general contractor, to determine probable construction costs for such repairs.

To conduct this assessment, KPFF reviewed available original construction documents and performed physical testing of existing structural elements. Concrete core samples were removed and tested to determine the concrete compressive strength. Reinforcing bar samples were removed and tested to determine the rebar yield and ultimate strength. Based on the original construction documentation and the testing, KPFF analyzed the gravity system for conformance to the *2010 Oregon Structural Specialty Code* (*2010 OSSC*), and analyzed the lateral system for conformance to *ASCE 41-06, Seismic Rehabilitation of Existing Buildings*.

# *Assessment Methodology*

# *Assessment Methodology*

All findings presented in this report are based on the review of documentation provided by the City of Portland and field work performed by the project team.

## Background Research

Prior to conducting the physical assessment, FFA and the assessment team reviewed the following City documents predominantly detailing the numerous piecemeal repairs carried out over the past 30 years. These documents are listed chronologically and include a brief synopsis.

**City of Portland Public Office Building Construction Documents,**
Graves/Roth/Wundram, May 6, 1981 –

Original construction documents.

**"Exterior Ceramic Tile Efflorescence Study",** Richard J. Fowler, July 20, 1988

A study of the tile cladding on the lower floors (1-4) was conducted to assess and mitigate efflorescence streaking on the tile and glass surfaces of the building. Destructive investigation was conducted at a field tile and top of parapet tile, as well as at flashing locations. Findings included: improper flashing design and installation at the top of the parapet wall; ineffective termination of the tile into the concrete at the fourth floor; damaged tile glaze and mortar joints due to improper cleaning; lack of or ineffective weep holes; improper execution of expansion joints; cracked parapet walls; and separation of the roof deck topping slab from the walls and improper installation of the roof and drainage system. The implemented recommendations are outlined in the 1990 restoration project summary below.

**"Ceramic Tile Joint Restoration & Sealing" – Project Manual,** Richard J. Fowler, February 26, 1990

Construction specifications were issued for the execution of recommendations made by the 1988 tile study. Work was limited to the tiled base (Floors 1-4) and loggia and appears to have included: repointing and sealing grout joints, cleaning tile, and installing flashing over the top of the parapet walls and at transitions between tile and concrete. Specifications call for reinstallation of existing tile with gray grout to match existing and weep holes. Walls were to be cleaned with Sure-Klean Restoration Cleaner and Chem-Trete BSM 20 Weatherproofing was specified for application over all tile and grout joints as a breathable sealer. Flashings were specified as extruded aluminum factory-finished to match the tile.

**"Portland Building Window Wall Evaluation Study",** McBride Architects, PC, October 22, 1993

Focused on systemic curtain wall issues, this study noted the following: vertical mullions from the fourth to the eleventh floor were of concern; expansion joints were not installed as detailed - hairline joints with mechanically fixed cover plates; different gages of metal were used; no thermal breaks exist between frames and sills; the south elevation is

warping; moisture on the south collects at the fourth floor; sealants and gaskets have failed; and weep holes were not maintained. Water testing was performed along a section of the south curtain wall from the fourth to the eleventh floor.

**"Portland Building Window Repair" – Project Manual & Specifications,** McBride Architects, PC, August 25, 1994

The project appears to have consisted of repairs at windows #4-9S16 and #10S4 (per the FFA window # system) and the associated spandrel glass. Repairs included replacing the perimeter caulking for the entire section of curtain wall and replacing the gaskets for all of the glass units. Original frames and glass were maintained. It also appears that additional gravity and wind load clips were installed at the 4th, 7th and 9th floors. The performance-based specifications call for neoprene gaskets, but do not identify specific products for gaskets or sealants.

**"Portland Building Window Project Action Memo",** McBride Architects, PC, October 28, 1994

This memo related to the south elevation window repair project included a copy of the original painting specification outlining the paint colors and locations. Paint colors were originally from the 1982 Rodda Paint Color System.

**"The Portland Building Fourteenth Floor Reroofing Project" – Project Manual & Specifications,** McBride Architects, PC, September 9, 1994

Replacement of the existing roof system over the topping slab with a liquid applied roofing system over rigid insulation covered with concrete pavers. New flashing is shown caulked into existing reglets in the concrete parapet walls.

**"Exterior Ceramic Tile Efflorescence and Window Leak Study East and West Side of the Portland Building",** McBride Architects, PC, August 4, 1995

This study was undertaken to address issues at the red tile keystone areas of the east and west elevations (floors 11-15) similar to those identified in the 1988 study of the blue-green base tile. Findings were similar to those found at the base tile, however additional observations of interest include: the window section detailed in the original drawings differs from what was found in the field; existing tile joints are wider than is typically recommended; and there is uncertainty as to whether previous mass grout repairs were executed per repair specifications. A water absorption test (the rilem test) was executed at various grout joint locations showing rapid absorption, inconsistent paths of travel before reappearance, and often no reappearance of the water. Additionally, a window on the west elevation was dismantled and tiles were tap tested. Recommendations include flashing and adding a splice sleeve for expansion at window heads and sills, replacement of caulking and sealants, replacement of 40% of grout joints, application of grout colorant (Aqua Mix) and sealant, and cleaning of tile with Sure Klean Light Duty Restoration Cleaner.

**"Portland Building South Window Repair II" – Project Manual & Specifications,** McBride Architects, PC, September 5, 1995

Scope of work is outlined below under the 1998 project.

**"The Portland Building South Window Repair II" – Project Manual & Specifications,** McBride Architects, PC, April 21, 1998

The project appears to have consisted of repairing all windows at the south facade. Repairs appear to have included: replacing the perimeter caulking for each section of curtain wall and each punched opening, replacing all exterior gaskets, replacing interior gaskets only "as needed" (scope identifies 30% replacement), new flashing at the bottom of the curtain wall, and installation of additional gravity and wind load clips. Original frames and glass were maintained. Specifications call for all concrete surfaces to be painted with an elastomeric coating – per submittals, BASF-Thorolastic was used). Replacement gaskets are called out as EPDM.

**"The Portland Building North Window Repair (Change Order #1 to Portland Building South Window Repair II Project)",** McBride Architects, PC, February 17, 1999

This change order appears to have added repairs – similar to those performed at the south elevation in 1998 – to select locations at the north elevation. Work included elastomeric coating of concrete and stucco surfaces, replacement of sealants at one punched window, and repairs at all curtain wall assemblies on the north façade.

**"Portland Building Second and Third Floor Roofs",** McBride Architects, PC, May 28, 1999

This report appears to follow the completion of a reroofing project at the fourteenth floor with a "single membrane of modified liquid rubber and paver projections system". The study examines the second and third floor roof decks, as well as the fourth floor roof deck under Portlandia, to document conditions and components that will affect reroofing these roof decks with the system used at the fourteenth floor.

**"Initial Building Envelope Review",** Forensic Waterproofing Consultants, August 15, 2006

The study focuses on the west façade and multiple areas of noted water intrusion that Forensic Waterproofing then investigated. All areas of the façade were examined including the teal tile base, 2nd and 3rd floor roof systems, the curtain wall and window assemblies, and the red tile "keystone" element. The findings reiterate much of what had been noted in previous reports including failing sealants and gaskets, lack of back-up drainage systems or non-performing back-up drainage, etc. This report also identifies issues with the building design that create waterproofing challenges such as the lack of drainage slope at horizontal surfaces like the parapet walls, window sills and protruding architectural elements. A destructive investigation was carried out at the red tile keystone element that found several deficiencies not previously known. Dissimilar metal flashings (steel and aluminum) were found in full contact with each other behind the red tile and showed signs of galvanic corrosion. Also, the metal mesh behind the ceramic tile was severely rusted above the ribbon window assemblies. The 1995 McBride report notes that this course of tile is flared at the

bottom likely due to rust jacking from the rusting metal lath.

**"COP Portland Building Maintenance Interview",** McBride Architects, PC, September 25, 2008

The purpose of the staff interview was to identify known moisture problems in the building, clarify their maintenance status and discuss possible sources of the moisture and repair options. Most of the problems listed were related to window and roof system failures. The resulting repairs were typically made on the interior side of the assemblies. These repairs had a varying degree of success as noted in the interview.

Carlson Testing tried to locate the pins that secure the metal lath to the building concrete walls using Ground Penetrating Radar. This testing was un-successful at the time and selective demolition of wall tile was recommended.

**"COP Portland Building Field Report 6",** McBride Architects, PC, October 16, 2008

Per the previous interview and GPR testing, selective demolition of wall tile was done at two locations. A total of about 30 square feet of wall tile was removed. Items of note from the report:

Mortar was well bonded to the tile.

Grout was not well bonded to the tile.

Troweling of mortar bed was both vertical and horizontal in direction.

Individual tiles typically fracture when being removed and are not salvageable.

**"The Portland Building Penthouse Stucco and 14th Floor Roof Replacement" – Bid Documents,** McBride Architects, PC, March 2012

This scope of work includes replacement of the existing stucco cladding on the penthouse with a new rain screen stucco system, replacement of metal doors and louvers, replacement of the roof with a new membrane waterproof system, and replacement of roof and parapet related flashings.

A chronological chart of these studies and repair projects is included in the appendix, Item B.

## Field Assessment for the Exterior Envelope

Field assessments of the exterior envelope were conducted by two teams – the Facade Group at the exterior and FFA at the interior. The initial field assessment was conducted by both teams mid-September through mid-November, 2012. Conditions were observed during both 'dry moderate' and 'cold wet' weather conditions.

**Exterior Assessment**

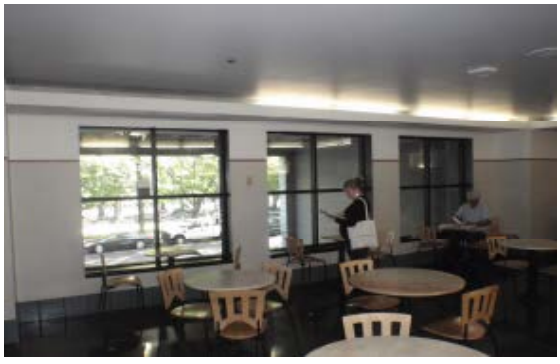
1. Exterior Inspection of Concrete and Punched Windows by boson's Chair.

2. Exterior Inspection of Red Ceramic Tile and Ribbon Windows by boson's Chair.

Utilizing boson's chairs, the Facade Group was able to access all exterior surfaces and glazing assemblies. The ceramic tile was visual inspected and sounded (tapped on with a mallet) to locate visible and hidden deterioration. Concrete and stucco surfaces were examined for cracking and deterioration. Glazing assemblies were visually inspected and probed as needed.

**Interior Assessment**

Glazing assemblies and adjacent finishes were also inspected from the interior by FFA. Conditions were photo-documented and recorded using standard field assessment forms and elevation drawings developed for the project.



3. Interior Assessment window #1 E 24

4. Interior Assessment Storefront SSF6

5. Interior Assessment Storefront SSF6 Close-up (note: failed glass gaskets)

Existing Conditions were mapped relative to windows and our numbering system developed specifically to facilitate coordination between interior and exterior findings. The numbering system and mapping can be found in the Condition Assessment section of this report.

**Invasive Investigation**

As a result of the initial assessment, the project team recommended conducting additional invasive investigations of the perimeter walls from the interior to gain further insight into the internal causes of external conditions. Approximately 168 test sites were identified by the project team.

Each site was opened up for observation and structural testing.

The exterior wall test sites were tested for hazardous materials (mold) and other deterioration.

When the observation / testing was complete, test sites were repaired to the original condition

6. Test Site 4-10 Wall opened up for observation

7. Test Site 4-10 Observation complete and wall repaired.

8. Test Site 11-1, 11-2 Interior finishes removed and concrete core samples taken.

9. Test Site 15-4 wall opened for observation

10. Test Site 15-7 opened, Extensive moisture penetration at hairline cracks in concrete wall was noted.

# *Report Organization*

# *Report Organization*

## *This report is organized into the following three sections:*

**Envelope Description** - Includes descriptions of the different materials and assemblies that make up the exterior envelope of the building,

**Condition Assessment** – Descriptions of the types of deterioration and deficiencies found by material/assembly type, and assessment findings including location, quantification, severity, and analysis of patterns and causes.

**Treatment Approaches** – Identifies historic status and lays out three approaches to treatment ranging from preservation to rehabilitation, and provides recommendations by material/assembly type

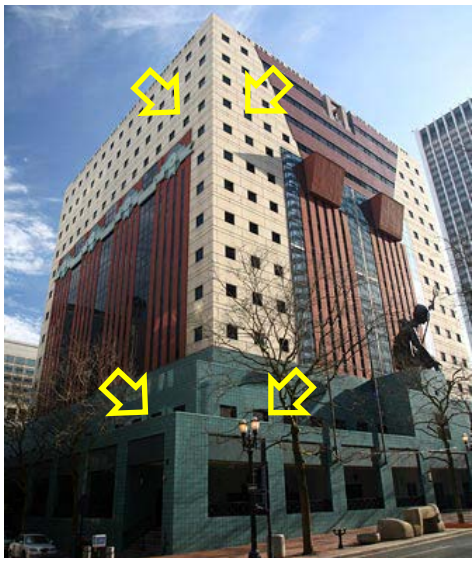
11. The Portland Building Northwest Corner

# *Envelope Description*

# *Envelope Description*

The exterior envelope of the Portland Building is comprised of four types of glazing assemblies, ceramic tile, concrete, and stucco. The following descriptions are provided to explain the composition and differences between each material and assembly before getting into their deficiencies and the extent of deterioration observed.

## Punched Windows Assemblies



12. Punched Windows Identified

**Assembly Description**

The punched windows on the Portland Building occur in both the concrete areas as well as the tile areas of the building on every floor. The general layout of the windows is a fairly regular pattern of varying sized windows ranging from 1'-8" x 1'-8" up to 7'-6" x 7'-6". The predominant size throughout the building is a 4'-0" x 4'-0" window which occurs mainly at the concrete areas. The windows are arranged such that they are all centered on each other with three windows contained within each column bay.

Similar to the ribbon window assemblies, the punched window assemblies consist of an aluminum and glass storefront system with a 2-1/4" x 5-1/2" mullion. While the system manufacturer has not been verified, it is reportedly a Kawneer system. It is a non-thermally broken aluminum storefront system, the kind typically reserved for retail-type applications. The finish of the aluminum frames appears to be black anodized. The assembly is anchored to the surrounding concrete at the head and sill via either bent plate anchors or extruded aluminum anchors.

Glazing all appears to be ¼" tinted glass set within each punched window section with a mixture of original gaskets and replacement gaskets found throughout the assemblies. The original gaskets were neoprene while the replacement gaskets appear to be EPDM.

## Storefront Assemblies:

13. Recessed Storefront at Loggia

**Assembly Description**

The storefront window assemblies line the recessed exterior wall of the first floor loggia and some of the exterior walls on the east ends of the south and north elevations. The bays of windows vary in size and configuration but are, in general,

approximately 10’ high and between 15’-20’ wide.

The assemblies are present in several different configurations of operable doors, fixed lites and metal panels; however, a typical arrangement consists of heavily tinted glazing at the bottom panels of the sidelights with vision glazing above. Operable doors have a metal panel at the bottom portion of the door with vision glazing above. All of the setback first floor storefront assemblies have an area of metal panel above the glazed area to accommodate tenant signage. At locations where the storefront systems are at the property line at the east ends on the south and north elevations, the configuration is comprised of 5 lites high by three lites wide of vision and spandrel glass.

14. Curtainwall Connection Detail

The assemblies are comprised of a mixture of curtain wall-type assemblies and storefront type assemblies. Similar to that on the ribbon window assemblies, the a majority of the first floor window systems are storefront-type assemblies consisting of an aluminum and glass storefront system with a 2-1/4” x 5-1/2” mullion. While the system manufacturer has not been verified, it is reportedly a Kawneer system. It is a non-thermally broken aluminum storefront system, the kind typically reserved for retail-type applications. The finish of the aluminum frames appears to be black anodized. The assembly is anchored to the surrounding concrete at the head and sill via either bent plate anchors or extruded aluminum anchors. Destructive testing at window surrounds had not been done to date in this investigation; therefore the anchors could not be verified.

At other first floor window locations, curtain wall-type assemblies have been provided. These systems appear to be similar to the large curtain wall areas that consist of 2-1/2” x 6” or 2-1/2” x 8” mullion. While the system manufacturer has not been verified, it is reportedly a Kawneer system. The finish of the aluminum frames appears to be black anodized. The assembly is anchored to the surrounding concrete at the head and sill via either bent plate anchors or extruded aluminum anchors. Destructive testing at window surrounds had not been done to date in this investigation; therefore the anchors could not be verified.

Glazing all appears to be ¼” tinted glass set within each section with a mixture of original gaskets and replacement gaskets found throughout the assembly. The original gaskets were neoprene while the replacement gaskets appear to be EPDM.

## Curtain Wall Assemblies:

15. Curtainwall Assemblies Identified

**Assembly Description**

The curtain wall assemblies are located on all four elevations in two typical configurations. The first configuration is a series of long, narrow, vertical bands of dark tinted glazing that span from the fourth floor to the tenth floor line. These areas of curtain wall are situated between vertical bands of red painted concrete and, combined together, form a visual pilaster appearance. The second configuration of curtain wall is a wider, vertical band of mirrored and tinted glazing that flanks the red concrete and curtain wall pilasters.

Similar to the ribbon windows, the curtain wall assemblies appear as continuous bands of windows from the exterior but are actually a combination of spandrel and vision glazing. The area of vision glazing is approximately a 4'x4' area with the sill of the vision glazing set about 3' above the finished floor.

The assembly consists of a 2-1/2" x 5-1/2" aluminum and glass, non-thermally broken, I-beam type curtain wall assembly with snap cap. The assembly consists of multiple aluminum extrusions that are fastened together to form the structural components of the assembly. The finished components then clad the structural components. The vision and spandrel glass is then held in place via gaskets set in gasket races. Sealant is then used to address the metal to metal interfaces to accomplish a weather-resistant assembly. While the system manufacturer has not been verified, it is reportedly a Kawneer system. The finish of the aluminum snap caps and mullions is black anodized aluminum.

The assembly is attached to the structure via a steel angle bolted to the backside of the mullion. A retrofit of the anchorage was accomplished in an attempt to allow the system to accommodate live load movements of the floors and thermal movements of the system. As part of this retrofit, the mullions were cut and spliced together. At the exterior, the system maintains weather-tightness at the splice via a splice plate that bridges between the upper and lower sections. This splice plate is sealed to the snap cap and fastened into place via a screw. While the connections we observed appear to be structurally sound with no apparent deformation or breakage, the system does suffer from air and water infiltration as well as the serviceability issues.

## Ribbon Window Assemblies:

16. Ribbon Windows Identified

**Assembly Description**

The ribbon window assemblies are located within the red tile keystone elements between the 11th and 14th floors on the east and west elevations. These assemblies consist of horizontal bands of dark tinted glazing and span the varying width of the keystone at each level.

The assemblies consist of an aluminum and glass storefront system with a 2-1/4" x 5-1/2" mullion. While the system manufacturer has not been verified, it is reportedly a Kawneer system. It is a non-thermally broken aluminum storefront system, the kind typically reserved for retail-type applications. The finish of the aluminum frames appears to

be black anodized. The assembly is anchored to the surrounding concrete at the head and sill via either bent plate anchors or extruded aluminum anchors. Destructive testing at window surrounds had not been done to date in this investigation; therefore the anchors could not be verified.

From the exterior, the windows appear as though they are continuous bands of vision glazing; however, much of the glazing area is spandrel glazing set in front of a concrete wall or stud framed wall. The vision glazing areas are approximately 4'x3'4" in area and are set about 6'-3" apart.

Glazing all appears to be ¼" tinted glass set within each storefront section with a mixture of original gaskets and replacement gaskets found throughout the assembly. The original gaskets were neoprene while the replacement gaskets appear to be EPDM.

## Ceramic Tile

17. Ceramic Tile Identified

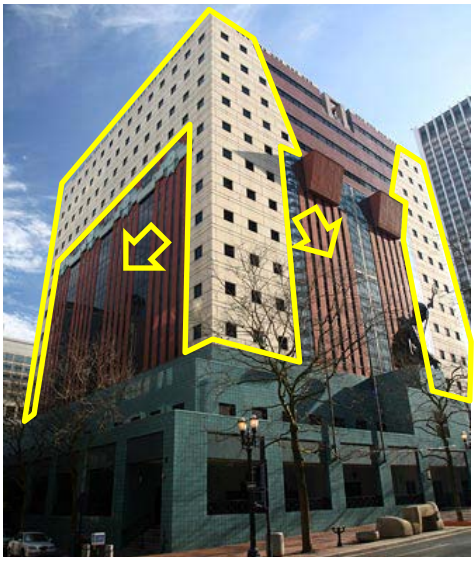
**Assembly Description**

The glazed ceramic tile on the Portland Building is installed in two distinct areas on the building. At the base there is a blue/green tile covering a majority of Floors 1-3 on all elevations. One the east and west elevations at Floors 11-14, there is a keystone element that is clad in red/terra cotta color tile between the ribbon window elements.

The tile assembly primarily consists of 9"x9" tile directly adhered to a 2-3" thick mortar setting bed. The mortar setting bed has metal reinforcing lath embedded within that is anchored back to the concrete wall through a 6mil polyethylene sheet that is meant to serve as a weather resistive barrier for this assembly. In both the base tile and keystone tile cases, the face of the tile is set proud of the surface of the surrounding elements by approximately 3", resulting in conditions where the tile returns back to those surfaces to complete the assembly.

The joints between the tiles measured between ½" and 1" wide and were composed of a combination of original mortar and mortar from previous repair campaigns.

## Concrete



18. Concrete Wall Identified

**Assembly Description**

The exterior walls of The Portland Building from the 4th floor to the roof are predominantly 8-9" thick formed, painted, reinforced concrete walls with an array of openings for punched windows and curtain wall. With the exception of the concrete at the 15th floor and those areas between curtain wall elements, two inch wide horizontal rustication joints are provided throughout the facade at punched window heads and sills, finish floor elevations and approximately 18" below finish floor. Vertical rustication joints of the same size are provided in a staggered configuration to provide a look similar to that of a stone facade. At the 15th floor and those areas between the curtain wall elements, a flat concrete surface has been provided.

An elastomeric coating has been painted on the building in varying colors. The coating is blue/green at the 15th floor, red between the curtain wall elements, and white on all other concrete surfaces. At the inset square panel design at the parapet level, a combination of green and blue/green was utilized. The exact type and brand of the coating is unknown at this time; however the coating has been measured to vary in thickness between 15 and 25 mils.

## Stucco

19. Stucco Assemblies Identified

**Assembly Description**

A multi-lift stucco system was utilized on the building at the four column capitals on the east and west elevations between levels 9 and 11. The capitals project out from the building face approximately seven feet and have a sloped face that returns back to the building at level 9. The north and south faces of the capital are vertical.

20. Roof at Column Capital

According to the original construction documents, the enclosure system for these elements consists of light gage framing

fastened to structure, gypsum sheathing with building paper, and a metal lath and 1" stucco system atop the building paper.

An elastomeric coating has been painted on the stucco. The coating is red in color, similar to adjacent concrete elements. The exact type and brand of the coating is unknown at this time; however the coating has been measured to vary in thickness between 15 and 25 mils.

The mechanical penthouse located above the 15th floor is also a stucco assembly; however, it does not fall under the scope of this assessment report.

## Interior Finishes & Features

21. Interior Wall at Spandrel Panel

22. Interior Wall at Concrete Wall

**Assembly Description**

From the interior all perimeter walls appear as solid patterned with square and rectangular 'punched' window openings. Curtain walls and ribbon windows are not distinguishable from the 'punched' windows.

The existing aluminum window and curtain wall frames are painted black. The furred wall returns at the head and jambs are finished with vinyl wallcovering on gypsum wall board. The sill consists of an aluminum plate attached directly to the frame and a large bullnosed return.

The furred interior wall construction consists of 3 5/8" metal studs at 24" on center, offset from the interior side of the concrete wall by about 1". Fiberglass batt, thermal insulation fills the cavity and is stick-pinned to the concrete. The interior wall finish is 5/8" thick gypsum wall board.

Typical finishes include black aluminum integral sill with bull nose edge at all windows. The walls are finished with vinyl wall covering which in most locations is painted.

The floor finish is carpet with rubber base. Ceiling assemblies are suspended acoustic tile at 9'-0" above the floor.

# *Condition Assessment*

# *Condition Assessment*

Following is a detailed assessment of the existing condition of each assembly noted above:

## Glazing System - 'Punched' Window Assemblies

23. Punched Windows in Concrete Wall

**Types of Deterioration**

*Failed Glazing Gaskets*

The glazing gaskets in the punched window assemblies keep the glass in place within the window frame and provide a primary weather seal against air/water intrusion. The gasket is held in place by setting it in a gasket race formed into the window frame. Compression between the glass and the gasket hold both in place.

24. 'Punched' Window Gasket Failure

Glazing gasket failure occurs in the form of shrinkage, cracking, and disengagement with the gasket race. This occurs with normal weathering and exposure.

*Failed Perimeter Sealant*

25. 'Punched' Window Sealant Failure

Adhesive failure is a condition whereby the failure mode of the sealant is typically caused by inadequate surface preparation of utilizing the incorrect sealant for the intended application. Failure occurs at the bond line between the sealant and the substrate where water and air are then allowed to enter the building.

26. ‘Punched’ Window Sealant Failure

Cohesive failure occurs when the sealant experienced a breakdown of the chemical properties due to exposure and starts to crack within the width of the sealant. While adhesion may still be occurring at the substrate interface, the sealant has failed due to the cracking experienced within the field of the sealant.

*Missing/Deteriorated Joinery Seals*

Joinery seals are the seals of the window assemblies where horizontal and vertical frame elements join together to form the frame of the window opening. At these junctures, a bead of sealant is typically run along the end of the frame member abutting the other frame member. When screwed together, the sealant forms a weather-tight seal. Omission or deterioration of the seal due to the thermal movements creates a condition where air and water can enter the assembly at a location that is not able to handle air and water.

27. ‘Punched’ Window Joinery Failure

*Corroding Window Frames*

Drainage from the tile areas above appears to have brought with it salts that are attacking the aluminum finishes in some locations.

In various areas throughout the assembly locations, the aluminum is being attacked by these salts and leaves an irreversible scar on the finish.

28. ‘Punched’ Window Finish Damage

*Deteriorated Finish*

At all of the punched window assemblies, the black anodized finish is starting to exhibit a weathered, chalky appearance typically caused by substandard quality of coating.

29. 'Punched' Window Finish Damage

**Condition of Exterior Assemblies**

*Failed Glazing Gaskets*

The glazing gaskets at a majority of the window assemblies were found to be in generally poor to fair condition. Recession of the gaskets is apparent in numerous locations. Additionally, glazing gaskets that became dislodged from the gasket race were noted in numerous locations throughout.

Similar to the ribbon window and curtain wall assemblies, attempts at repairs were apparent in the form of sealing the ends of the gaskets together with the thought that this would hold them in place. In effect, sealing the ends together holds the gaskets together but does not prevent shrinkage or resist the pulling effect of the shrinkage. As the gasket shrinks and recedes, it exerts a force on the perpendicular gasket to which it is sealed and, if that force is great enough, pulls the perpendicular gasket out of the gasket race creating a situation where excess water may infiltrate and overwhelm the system.

*Failed Perimeter Sealant*

The punched window assemblies rely heavily on sealant to resist air and water infiltration. While this is true of many window assemblies, The Portland Building relies heavily on the outer, exposed seal to provide the only line of defense against air and water infiltration. A failure of the perimeter seal through either thermal movements of the flashings and frames, or deterioration of the sealant itself allows a breach in the system.

We also observed that repairs have been attempted in the past. These repairs either consisted of, in small part, complete replacement of the sealant joint or, more typically, were composed of the application of a skim coating of sealant to provide a "ban-aid" type remediation to patch up the hole(s) in the sealant. These attempts at remediation were observed as being severely deteriorated and are no longer providing protection from air and water infiltration.

Additionally, at the punched windows set within the tile areas, the perimeter seal bridges the gap between the window system and face of the tile. Any water that penetrates through the tile at the head, jamb or sill has the opportunity to infiltrate the building at these locations as there is no seal between the window system and a weather barrier. The water staining observed on the backside of the concrete at some of the destructive openings we observed appears indicative of this discontinuity.

*Missing/Deteriorated Joinery Seals*

Missing and/or deteriorated joinery seals were observed in numerous locations throughout the building. While these areas have been attempted to be remediated in the past, these efforts have again failed and are allowing for the passage of air and water into the curtain wall assembly, thereby compromising the ability of the system to resists these elements.

*Corroding Window Frames*

In a few locations, the chemical attack on the aluminum by the runoff from the tile assembly appears to be the result of the

inadequate flashing at the heads combined with the efflorescence issue described in the "Ceramic Tile" section. The salts within the tile assembly migrate with water through the tile joints and wash down over the anodized aluminum surfaces, producing etching and staining of the anodized coating and underlying aluminum.

*Deteriorated Finish*

The finish of the punched window assemblies appears to be showing age throughout. While there have not been any noticeable past attempts at restoring/remediating the fading/chalking by painting (as at the ribbon window assemblies described below) it should be noted that the fading and chalking will continue to be an issue.

## Glazing System - Storefront Assemblies

30. Recessed Storefront Assemblies at Loggia Level

31. Surface Storefront Assemblies at Loggia Level

**Types of Deterioration**

*Failed Glazing Gaskets*

The glazing gaskets in the storefront window assemblies at the first floor (either storefront or curtain wall types) keep the glass in place within the window frame and provide a primary weather seal against air/water intrusion. The gasket is held in place by setting it in a gasket race formed into the window frame. Compression between the glass and the gasket hold both in place.

32. Storefront Failed Glazing Gasket

Glazing gasket failure occurs in the form of shrinkage, cracking, and disengagement with the gasket race. This occurs with normal weathering and exposure.

*Failed Perimeter Sealant*

Adhesive failure is a condition whereby the failure mode of the sealant is typically caused by inadequate surface preparation of utilizing the incorrect sealant for the intended application. Failure occurs at the bond line

between the sealant and the substrate where water and air are then allowed to enter the building.

Cohesive failure occurs when the sealant experienced a breakdown of the chemical properties due to exposure and starts to crack within the width of the sealant. While adhesion may still be occurring at the substrate interface, the sealant has failed due to the cracking experienced within the field of the sealant.

*Deteriorated Finish*

At most of the storefront and curtain wall assemblies at the first floor, the black anodized finish is starting to exhibit a weathered, chalky appearance typically caused by substandard quality of coating.

*Inadequate and Failed Flashing Detailing*

The flashing at the sills of a few of the storefront window assemblies appears to have been removed at some point in the past, presumably as part of a tenant improvement project.

This has exposed the underlying intersection between the concrete walkway and the building.

33. Storefront Inadequate Flashing

*Cracked Glazing Units*

Localized cracked glass is typically indicative of an isolated incident whereby thermal expansion and contraction may have resulted in a pinching of the glass against the surround aluminum or may be caused by an edge defect in the glass.

34. Storefront Cracked Glazing

*Missing/Deteriorated Joinery Seals*

Joinery seals are the seals of the window assemblies where horizontal and vertical frame elements join together to form the frame of the window opening. At these junctures, a bead of sealant is typically run along the end of the frame member abutting the other frame member. When screwed together, the sealant forms a weather-tight seal. Omission or deterioration of the seal due to the thermal movements creates a condition where air and water can enter the assembly at a location that is not able to handle air and water.

35. Storefront Deteriorated Joinery Seals

**Condition of Exterior Assemblies**

With the exception of the east ends of the north and south elevations, the recessed storefront assemblies on the first floor of the building generally show less wear and tear from natural elements due to being set back from the exterior by approximately 15-25 feet. However, these areas are showing consistent wear and tear due to everyday use and traffic. At the eastern ends of the north and south elevations, where the storefront assemblies are on the exterior surface, the wear and tear due to exposure is predominant. The following are conditions observed at these areas:

*Failed Glazing Gaskets*

The glazing gaskets throughout the storefront window assemblies were found to be in generally poor condition. Recession of the gaskets is apparent in numerous locations. Additionally, cracking of the gaskets due to exposure was noted in several locations.

*Failed Perimeter Sealant*

Similar to the punched window assemblies, the storefront window assemblies rely heavily on sealant to resist air and water infiltration. While this is true of many window assemblies, The Portland Building relies heavily on the outer, exposed seal to provide the only line of defense against air and water infiltration. A failure of the perimeter seal through either thermal movements of the flashings and frames allows a breach in the system.

A majority of the storefront window assemblies were experiencing failure of the perimeter sealant joint at the head, jambs and sills. In a few locations, the sealant joint is missing altogether.

*Deteriorated Finish*

The finish of the storefront window assemblies appears to be showing age throughout the first floor. While there have not been any noticeable past attempts at restoring/remediating the fading/chalking by painting (as at the ribbon window assemblies) it should be noted that the fading and chalking will continue to be an issue.

*Inadequate and Failed Flashing Detailing*

At the sill of the north and west storefront areas, there does not appear to be any flashing located under the assembly. While this may not result in water infiltration at the window perimeter due to a seal between the window system and concrete below, the condition results in an unfinished aesthetic and may provide a place for insects to nest.

*Cracked Glazing*

A glass lite at the City Kids facility was observed to be cracked during our investigation. The cracked lite at the south elevation setback appears to be caused by a chip in the glass. This chip has resulted in a small crack that has developed by stresses due to thermal expansion and contraction. This appears to be an isolated condition related to the storefront assemblies.

*Missing/Deteriorated Joinery Seals*

Missing and/or deteriorated joinery seals were observed in numerous locations throughout the assemblies. These conditions allow for the passage of air and water into the ribbon window system, thereby compromising the ability of the system to resists these elements.

*Incorrect Colored Metal Panels*

In a few of the metal panel signage areas, the team noted that the metal panels are not of the same color as the rest of the storefront assembly. The panels appear to have been replaced as some point in the past with a bronze colored panel as opposed to a black panel to match the storefront.

36. Incorrect Color Match

## Glazing System - Curtainwall Assemblies

37. Curtainwall Assembly at North and South Elevations (vertical sections between the red vertical concrete bands and larger sections between the concrete columns)

**38.** Curtainwall Assembly at East and West Elevations (vertical sections between the red vertical concrete bands and larger sections between the concrete columns)

**Types of Deterioration**

*Failed Glazing Gaskets*

The glazing gaskets in the curtain wall assembly keep the glass in place within the window frame and provide a primary weather seal against air/water intrusion. The gasket is held in place by setting it in a gasket race formed within the structural component of the window frame. Compression between the glass and the gasket hold both in place.

The glazing gasket failure that was observed has occurred in the form of shrinkage, cracking, and disengagement with the gasket race. This occurs with normal weathering and exposure.

39. Curtainwall Failed Glazing Gaskets

40. Curtainwall Failed Glazing Gaskets

41. Curtainwall Failed Glazing Gaskets

*Failed Perimeter Sealant*

42. Curtainwall Failed Perimeter Sealant

43. Curtainwall Failed Perimeter Sealant

Adhesive failure is a condition whereby the failure mode of the sealant is typically caused by inadequate surface preparation of utilizing the incorrect sealant for the intended application. Failure occurs at the bond line between the sealant and the substrate where water and air are then allowed to enter the building.

44. Curtainwall Failed Perimeter Sealant

Cohesive failure occurs when the sealant experienced a breakdown of the chemical properties due to exposure and starts to crack within the width of the sealant. While adhesion may still be occurring at the substrate interface, the sealant has failed due to the cracking experienced within the field of the sealant.

*Inadequate and Failed Flashing Detailing*

Two separate flashing conditions occur at each of the curtain wall sections. At the head, where the curtain wall meets concrete above, the curtain wall is installed proud of the face of concrete by approximately 3-4". A sheet metal flashing has been installed that is intended to shield the curtain wall from direct weathering and exposure. The flashing starts under the concrete, extends out past a sealant joint installed between the concrete and the flashing, slopes to drain outward, and then turns down the face of the upper horizontal mullion with a drip edge. There are no connections between the sealant joint at the concrete and the curtain wall. In some cases, a sealant joint has been provided beneath the drip edge to the face of the curtain wall mullion. Splices in the flashing appear to be limited to the wider expanses of curtain wall and are accomplished via a sealed lap splice.

At the sill of the curtain wall, another flashing condition exists, however this flashing condition is a retrofit to the original condition. The original condition was designed to consist of a sealant joint to the underlying concrete. This then left the returning, up-facing ceramic tile exposed to weather. During a campaign to address water infiltration at the tile, a sheet metal flashing appears to have been added to the sill of the curtain wall to drain water away from the sill and onto the new sheet metal flashing atop the ceramic tile. This new flashing at the sill has a considerable slope to drain. Like the head, splices in the flashing appear to be limited to the wider expanses of curtain wall and are accomplished via a sealed lap splice.

45. Curtainwall Inadequate Flashing Detailing

46. Curtainwall Inadequate Flashing Detailing

47. Curtainwall Inadequate Flashing Detailing

Typical failures at the sheet metal flashing areas consist of sealant failure, lap splice failures, inadequate design/installation, fastener failure and back-pitched flashing.

*Failed Expansion Joints*

48. Curtainwall Failed Expansion Joints

49. Curtainwall Failed Expansion Joints

The expansion joints of the curtain wall assembly occur at each vertical mullion of the curtain wall system at Floors 5, 7 and 9. These joints are intended to provide a mechanism for the curtain wall assembly to accommodate thermal movement of the system as well as live load deflection of the floors to which it is anchored. The joints were installed as part of the retrofit campaign described above. The retrofit is highly dependent upon sealant and the applied splice cap to maintain a weather-tight enclosure. The sealant and the splice cap were observed to have been in a state of deterioration whereby the system does not appear to be provided adequate protection from air and water infiltration.

*Missing/Deteriorated Joinery Seals*

Joinery seals are the seals of the window assemblies where horizontal and vertical frame elements join together to form the frame of the window opening. At these junctures, a bead of sealant is typically run along the end of the frame member abutting the other frame member. When screwed together, the sealant forms a weather-tight seal. Omission or deterioration of the seal due to the thermal movements creates a condition where air and water can enter the assembly at a location that is not able to handle air and water.

50. Curtainwall Deteriorated Joinery Seals
51.

*Deteriorated Finish*
At all of the curtain wall assemblies, the black anodized finish is starting to exhibit a weathered, chalky appearance typically caused by substandard quality of coating.

**Condition of Exterior Assemblies**

*Failed Glazing Gaskets*
The glazing gaskets throughout the curtain wall assemblies were found to be in generally poor condition, notably at the south elevation. Recession of the gaskets is apparent in numerous locations. Additionally, glazing gaskets that became dislodged from the gasket race were noted in numerous locations throughout.

Attempts at repairs were apparent in the form of sealing the ends of the gaskets together with the thought that this would hold them in place. In effect, sealing the ends together holds the gaskets together but does not prevent shrinkage or resist the pulling effect of the shrinkage. As the gasket shrinks and recedes, it exerts a force on the perpendicular gasket to which it is sealed and, if that force is great enough, pulls the perpendicular gasket out of the gasket race creating a situation where excess water may infiltrate and overwhelm the system.

In addition to the gasket recession, thermal movements of the curtain wall assembly also appear to have caused the gaskets to become disengaged.

*Failed Perimeter Sealant*
The curtain wall assembly relies heavily on the sealant at the perimeters to resist air and water infiltration. While this is typical of curtain wall assemblies, the assembly on the Portland Building is a single line of defense system where a failure in the outermost sealant joint compromises the integrity of the system and allows for air and water infiltration. Modern assemblies allow for a secondary line of defense that is protected from weathering and maintains the weather-tight enclosure.

Numerous conditions of adhesive and cohesive failure of the perimeter sealant joint were observed throughout the building with a notable increase in deterioration at the south and west elevations. Additionally, we observed that repairs have been attempted in the past. These repairs either consisted of, in small part, complete replacement of the sealant joint or, more typically, were composed of the application of a skim coating of sealant to provide a "ban-aid" type remediation to patch up the hole(s) in the sealant. These attempts at remediation were observed as being severely deteriorated and are no longer providing protection from air and water infiltration.

*Inadequate and Failed Flashing Detailing*
The flashing conditions at the head of the curtain walls are highly dependent on sealant to maintain protection from bulk water penetration. This strategy is one that is highly dependent on maintenance to ensure the sealant and flashing are performing adequately. Additionally, the flashing is intended to act as a water shedding layer only and does not provide protection from air and vapor infiltration under and around it. Generally, the sealant at the laps and interfaces with adjoining surfaces is exhibiting signs of adhesive and cohesive failure described in "Failed Perimeter Sealant" above. These failures allow for bulk water intrusion.

Another condition with the flashing is that, in several locations, the flashing is back-pitched toward the building; thereby not providing adequate drainage away from the building and potentially exacerbating the failed sealant condition by allowing water to sit against the seams.

At the sill, the flashing acts similarly to the head in that it is intended to be a water

shedding layer. The installation is again highly dependent on sealant to maintain this water-tight installation. The sealant at these locations is exhibiting signs of advanced aging and deterioration in the form of adhesive and cohesive failure.

*Failed Expansion Joints*

At a majority of the expansion joints, sheared sealant and dislodged expansion joint covers were observed. In several cases, the expansion joint cover is beginning to be pushed from the building and is held in place by a single fastener drilled through the face of the curtain wall.

As the curtain wall assembly expands and contracts due to exposure, the thin seals around and within the expansion joint are stressed to the point that the sealant shears and no longer provides weather protection. These conditions are most notable on the south elevation where thermal movement of the system is greatest due to exposure as compared to the other elevations.

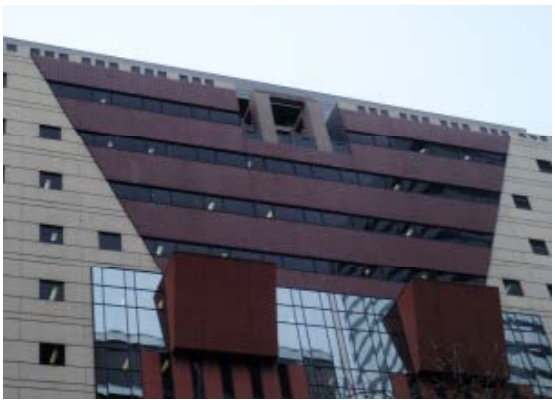
*Missing/Deteriorated Joinery Seals*

Missing and/or deteriorated joinery seals were observed in numerous locations throughout the building assemblies. While these areas have been attempted to be remediated in the past, these efforts have again failed and are allowing for the passage of air and water into the curtain wall assembly, thereby compromising the ability of the system to resists these elements.

*Deteriorated Finish*

The finish of the curtain wall assemblies appears to be showing age, notably at the south and west elevations. There have not been any noticeable past attempts at restoring/remediating the fading/chalking by painting. It should be noted that the fading and chalking will continue to be an issue.

## Glazing System - Ribbon Windows @ Red Tile Keystones:



52. Ribbon Windows @ Keystone

**Types of Deterioration**

*Failed Glazing Gaskets*

The glazing gaskets in the ribbon window assemblies keep the glass in place within the window frame and provide a primary weather seal against air/water intrusion. The gasket is held in place by setting it in a gasket race formed into the window frame. Compression between the glass and the gasket hold both in place.

53. Ribbon Windows Failed Gaskets

54. Ribbon Windows Failed Gaskets and Finish

Glazing gasket failure occurs in the form of shrinkage, cracking, and disengagement with the gasket race. This occurs with normal weathering and exposure.

*Failed Perimeter Sealant*

55. Ribbon Windows Failed Perimeter Sealant

Adhesive failure is a condition whereby the failure mode of the sealant is typically caused by inadequate surface preparation of utilizing the incorrect sealant for the intended application. Failure occurs at the bond line between the sealant and the substrate where water and air are then allowed to enter the building.

56. Ribbon Windows Failed Perimeter Sealant

Cohesive failure occurs when the sealant experienced a breakdown of the chemical properties due to exposure and starts to crack within the width of the sealant. While adhesion may still be occurring at the substrate interface, the sealant has failed due to the cracking experienced within the field of the sealant.

*Failed Expansion Joint Sealant*

Aluminum, like all materials, expands and contracts with changes in temperature of the material. Expansion joints were provided in the original construction by providing a ½" to ¾" gap in the framing elements at approximately 10' on center. Sealant was utilized to waterproof the joint. However, over time, thermal movements of the system wear on the sealant and cause adhesive and cohesive failure similar to that noted above in "Failed Perimeter Sealant".

56. Ribbon Windows Failed Expansion Joint Sealant

*Deteriorated Finish*

At all of the ribbon window assemblies, it appears that frames were painted with an unknown paint in an attempt to restore the finish and look of the original frames. This paint is flaking and cracking throughout. The underlying black anodized finish is exposed at the areas where the paint is flaking, revealing a weathered, chalky appearance typically caused by substandard quality of coating.

57. Ribbon Windows Deteriorated Finish

58. Ribbon Windows Deteriorated Finish

*Corroding Window Frames*

Drainage from the tile areas above appears to have brought with it salts that are attacking the aluminum finishes. In various areas throughout the assembly, the aluminum is being attacked by these salts and leaves an irreversible scar on the finish.

59. Ribbon Windows Corroding Window Frames

*Inadequate and Failed Flashing Detailing*

The flashing at the head and sills of the ribbon window assemblies has been previously

documented and a repair partially implemented as a result of the 1995 McBride study. The currently existing flashing is failing at the splice joints and suffers from an exposed-sealant dependent detailing at the ends of the ribbon windows.

60. Ribbon Windows Failed Flashing Detail

61. Ribbon Windows Failed Flashing Detail

*Corroding Flashing Fasteners*

The flashing installed at the heads of the ribbon windows as a result of the 1995 McBride report were fastened through the window frame with pop rivets to secure them into place. Corrosion of the metal fasteners has occurred over time due to galvanic action.

62. Ribbon Windows Corroding Flashing Fasteners

*Missing/Deteriorated Joinery Seals*

Joinery seals are the seals of the window assemblies where horizontal and vertical frame elements join together to form the frame of the window opening. At these junctures, a bead of sealant is typically run along the end of the frame member abutting the other frame member. When screwed together, the sealant forms a weather-tight seal. Omission or deterioration of the seal due to the thermal movements creates a condition where air and water can enter the assembly at a location that is not able to handle air and water.

*Loose Fasteners*

Loose fasteners were noted at various locations throughout the ribbon window assemblies. These fasteners were typically used to fasten flashing elements back to the building.

**Condition of Exterior Assemblies**

*Failed Glazing Gaskets*

The glazing gaskets throughout the ribbon window assemblies were found to be in generally poor condition. Recession of the gaskets is apparent in numerous locations. Additionally, glazing gaskets that became dislodged from the gasket race was noted in numerous locations throughout.

Attempts at repairs were apparent in the form of sealing the ends of the gaskets together with the thought that this would hold them in place. In effect, sealing the ends together holds the gaskets together but does not prevent shrinkage or resist the pulling effect of the shrinkage. As the gasket shrinks and recedes, it exerts a force on the perpendicular gasket to which it is sealed and, if that force is great enough, pulls the perpendicular gasket out of the gasket race creating a situation where excess water may infiltrate and overwhelm the system.

*Failed Perimeter Sealant*

The ribbon window assemblies rely heavily on sealant to resist air and water infiltration. While this is true of many window assemblies, The Portland Building relies heavily on the outer, exposed seal to provide the only line of defense against air and water infiltration. A failure of the perimeter seal through either thermal movements of the flashings and frames allows a breach in the system.

At the ends of the ribbon windows, failure of the sealant joint to the adjoining concrete was evident. Additionally, failure of the sealant at the ends of the head flashing allows water to bypass the perimeter sealant and migrate into the building.

These issues are systemic to the ribbon window assemblies and require frequent, on-going maintenance and review.

*Failed Expansion Joint Sealant*

Nearly all of the expansion joints that are built into the ribbon window assembly are experiencing some level of deterioration. With thermal expansion and contraction of the window system, stresses are induced on the sealant that either cause adhesive failure or cohesive failure of the sealant. In a majority of the cases, failure appears in the form of adhesive failure. At that point, water can enter the system behind the perimeter sealant joint below and migrate into the building.

In the 1995 McBride report, an expansion joint cover was suggested to be installed at all of the joints; however this does not appear to have been implemented.

*Deteriorated Finish*

The finish of the ribbon window assemblies appears to be significantly showing age throughout the building. The past attempts at restoring/remediating the fading/chalking by painting over the frames has clearly failed over time and are no longer providing benefit to the assembly.

*Corroding Window Frames*

The chemical attack on the aluminum by the runoff from the tile assembly appears to be the result of the inadequate flashing at the heads discussed in further detail below. The salts within the tile assembly migrate with water through the flashing joints or at the rivet locations and wash down over the anodized aluminum surfaces, producing etching and staining of the anodized coating and underlying aluminum.

*Inadequate and Failed Flashing Detailing*

The flashing condition around the ribbon windows attempts to address the water that gets behind the tile and direct it to the exterior before it hits the window head. A sheet metal flashing is present directly behind the first tile above the head, extends out past the face of the tile, and turns down with a drip edge along the length of the window. A sealant joint with weep tubes at approximately 24” on center is provided between the tile and the top of the flashing. Splices in the flashing are addressed through a random collection of lap splices and butt splices.

A remediation campaign in 1995 attempted to address water infiltration through the addition of add-on sheet metal flashing

elements at the splice joints of the window head and sill, as well as continuous sheet metal flashing behind the tile at the window head. While the remediation may have addressed direct water infiltration through the splice joints at the time, there still exists issues related to water infiltration through the tile above that has an opportunity to bypass the flashings altogether. Additionally, the sealant joint between the tile and flashing at the head has the ability to hold water over time and allow for potential migration through deteriorated splices in the sheet metal flashing.

At the sill, a sheet metal flashing is installed with a sealant joint between the flashing and the window system. The extent of the flashing behind the sealant joint is unclear as there were no open areas to observe nor are there any as-built drawings of this condition; however it is presumed that the flashing extends back to the face of concrete without an upturned leg to prevent water infiltration into the building. The sealant joints are showing signs of deterioration and separation from the window frame.

In addition to the issues at the head and sill described above, the jambs of the ribbon window systems have issues in that they are relying heavily on a patchwork assembly of sealant providing a single line of defense against air/water infiltration. These joints are showing signs of deterioration.

*Corroding Flashing Fasteners*

Following on the inadequate flashing conditions noted above, the water infiltration noted appears to have produced corrosion of the steel pop rivets used to join the aluminum flashing to the aluminum window frame. The steel is beginning to rust and the galvanic corrosion that is present on the aluminum is the result of dissimilar metals that are in contact with each other in a wet environment. Galvanic corrosion in aluminum is typically mild; however, in a high alkaline environment, the corrosion can be amplified.

*Missing/Deteriorated Joinery Seals*

Missing and/or deteriorated joinery seals were observed in numerous locations throughout the building assemblies. These conditions allow for the passage of air and water into the ribbon window system, thereby compromising the ability of the system to resists these elements.

*Loose Fasteners*

Loose fasteners were observed at various locations throughout the building. These fasteners were mainly at flashing conditions where the flashing is screwed back to the building to lock it into place. Due to building and thermal movements, the several fasteners have begun to “back out” of the assembly

## Ceramic Tile

63. Red Ceramic Tile at Keystone

64. Blue-Green (Teal) Tile at Base

**Types of Deterioration**

*Cracked Tile*

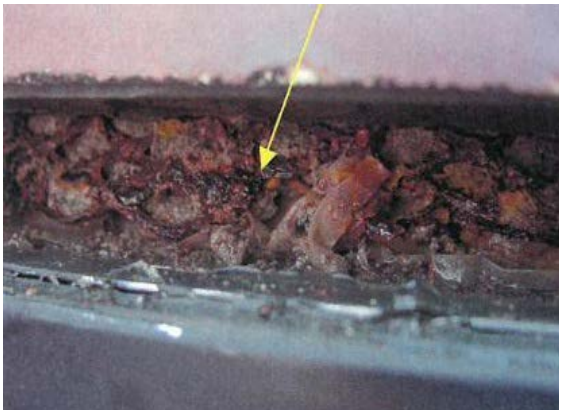
The tiles of the Portland Building are a glazed ceramic tile, wherein a smooth, impenetrable glaze is applied to the surface of a relatively porous substrate. The observed cracking of the glazed tile appears to be caused by either the freezing of moisture trapped behind the tile, corrosion of the expanded metal lath and associated anchorage directly behind the tile, or damage from maintenance operations. While rain water does not penetrate the glaze, it does penetrate the porous mortar between tiles. The glaze then acts as a barrier, preventing the moisture within the assembly from escaping. The moisture trapped against the inner surface of the glaze freezes and expands. In doing so, it exerts sufficient pressure to crack the tile.

65. Ceramic Tile, Cracked, Sealant Failure

66. Ceramic Tile, Cracked, Sealant Failure

*Corroding Metal Lath*

The reinforcing lath embedded within the setting bed is composed of expanded steel anchored to the concrete. As the setting bed is repeatedly wetted, corrosion of the steel reinforcing lath occurs. When steel corrodes, it expands up to eight to ten times its original size, and exerts enormous pressure on the surrounding setting bed. This pressure could affect the bond of the tile to the setting bed and the mechanical attachment of the setting bed to the concrete.



67. Corroded Metal Lath at Ribbon Window head

*Efflorescence*

Efflorescence is a crystalline deposit, usually white, of water-soluble salts on the surface of the masonry and is often observed just below the point of moisture entry due to rain or condensation. Moisture within the mortar/grout joint and setting bed serves as a vehicle to carry water-soluble salts to the surface. The denser the material, such as concrete, brick, or stone, the more difficult it is for water to transport the salts. The more porous the material, such as mortar or grout, the easier it is for water to transport the salts. Upon reaching the surface of the assembly, the water evaporates, depositing the water-soluble salts. These salts present an aesthetic issue, as they mar the appearance of the tile,

and a technical issue in that they salts can deteriorate adjacent aluminum and glass assemblies.

68. Ceramic Tile, Efflorescence

69. Ceramic Tile, Efflorescence

70. Ceramic Tile, Efflorescence

*Deteriorated Mortar Joints*

Signs of cracked and eroding mortar joints were noted throughout the tile areas. Cracking of the mortar joints appears to be caused by a combination of differential movement of building elements affecting the tile, or a condition within the tile assembly itself where "movement joints" appear to have been omitted.

The erosion of the joints appears to be caused by normal weathering of the joints over the life of the building. However, deteriorated or eroded mortar joints permit intrusion of water which becomes trapped within the assembly. This ongoing deterioration, and related water intrusion, accentuates the efflorescence issue noted above.

71. Ceramic Tile Deteriorated Mortar Joints

*Ineffective Re-pointing*

In previous repair campaigns, re-pointing of the mortar joints was attempted. Failure of those joints is, in most cases, caused by poor workmanship or design during that prior campaign, when replacement mortar was poorly formulated, and when mortar joints were not cut back deep enough or wide enough to achieve good bonding strength.

72. Ceramic Tile Ineffective Re-pointing Sealant Failure

73. Ceramic Tile Ineffective Re-pointing Sealant Failure

74. Ceramic Tile Ineffective Re-pointing

*Hollow Sounding Tile*

A review of prior reports noted that the tile was "well secured to the setting bed and concrete substrate" (McBride, 1995). Photographs of past tile removal indicate that the tile was set into the tooled setting bed but did not achieve full adhesion throughout the area. Additionally, the tooling of the setting bed was not consistent in orientation. In some cases the tooling of the setting bed was horizontal, in others it was vertical.

*Exposed Horizontal Mortar Joints*

The 1998 Fowler report and subsequent additions/repairs attempted to address the issue of up-facing horizontal mortar joints at the fourth floor tile. The joints at that location have been retrofitted with a sheet metal flashing to protect them from direct weathering and moisture intrusion behind the tile. However, at the tile at the keystone element, this flashing is missing and signs of erosion, prior repairs and moss growth are evident.

75. Ceramic Tile Exposed Horizontal Joints and Sealant Failure

*Deteriorated Sealant and Expansion Joints*

At the keystone element, a sealant joint bridges the gap between the tile assembly and the concrete. Adhesive and cohesive failure of these joints was apparent.

The expansion joints contained with the field of the tile have been confirmed to only be partial depth joints extending back to the face of the setting bed. Sealant has been utilized to seal between tiles on either side of the joint and is intended to provide for movement of the tile system. Adhesive and cohesive failure was observed throughout the building.

76. Ceramic Tile Sealant Failure

77. Ceramic Tile Sealant Failure

Adhesive failure is a condition whereby the failure mode of the sealant is typically caused by inadequate surface preparation of utilizing the incorrect sealant for the intended application. Failure occurs at the bond line between the sealant and the substrate where water and air are then allowed to enter the building.

Cohesive failure occurs when the sealant experienced a breakdown of the chemical properties due to exposure and starts to crack within the width of the sealant. While adhesion may still be occurring at the substrate interface, the sealant has failed due to the cracking experienced within the field of the sealant. Cohesive failure can also be caused due to an installation defect called "three-sided adhesion". In this case, the sealant is adhered to both sides of the joint but also the back of the joint, or in this case the setting bed. Repeated movements of the tile on either side combined with adhesion at the setting bed causes the sealant joint to tear.

**Condition of Exterior Assemblies**

*Cracked Tile*

A few cracked tiles were observed in varying locations throughout the building. The cracking appeared to occur in isolated locations and did not appear to affect surrounding tiles.

*Corroding Metal Lath*

In a few locations where the metal lath was exposed to view, we observed that the lath is beginning to show signs of corrosion that may begin to affect the long-term durability of the system. However, the exposed lath is small in quantity and location. Additional destructive testing would be required at areas around the building to properly ascertain the condition of the lath.

*Efflorescence*

At areas all around the building, efflorescence is occurring at the mortar joints and is a major issue for the building. This indicates that moisture is infiltrating into the joints and dissolving the salts in the mortar and underlying setting bed. Upon evaporation, the salts are deposited on the surface. The source of the salts appears to be the mortar bed and underlying concrete structure.

In several cases, the efflorescence is running down the face of the glass and aluminum windows. In these cases, water from behind the tile makes its way out of a weep hole above the window and concentrates the drainage on the window. As the efflorescence comes in contact with the window assembly, it corrodes the aluminum and begins to etch the glass.

*Deteriorated Mortar Joints*

Deteriorated mortar joints were observed throughout the base and keystone tile. In many cases, the deterioration consisted of a wearing of the mortar over time due to weathering. The deterioration of the mortar was generally spread evenly throughout all elevations and was found to be marginally more pronounced on the south elevation.

Cracking of the mortar joints was observed in nearly every location where an expansion joint should have been placed. This was observed to consistently occur where the joint was omitted but an expansion joint was provided in the field above and below in line with the cracked joint.

*Ineffective Re-pointing*

In numerous locations where the mortar repairs were previously attempted, we noted that the repair is failing and exposing the underlying mortar. The reasoning for this failure appears to be the method used to repair the mortar and poor workmanship. An approximately 3/8-1/2" wide saw cut was placed into the mortar joint at mid width. New mortar was placed into the saw cut and then fanned out to the tile edges in a thin layer creating a "T" profile of the new mortar. Given the joint width and delicate nature of the tile, it is presumed that the contractor/designer chose this method to avoid potentially chipping/grinding the tile. However, it is the thin layers that are failing in numerous locations and possibly allowing excess water to infiltrate the assembly, thereby exacerbating the efflorescence issue described above.

*Hollow Sounding Tile*

Several areas on the keystone and base tile were sounded with a sounding hammer to check for potential spalling or un-adhered tiles. It was found that approximately 45-50% of the tile had a hollow sound when tested; however it does not appear that the tile is at risk of becoming un-adhered from the setting bed. No displaced tiles were observed in these areas nor were any cracks in the mortar joints.

A review of the previous investigation reports shows that the tile was adhered to the setting bed with mortar but that the mortar did not fully cover the entire area of the tile; thereby creating a void behind the tile. It does not appear that the voids are producing a condition that is detrimental to the tile.

*Exposed Horizontal Mortar Joints*

The original design of the tile had the tile returning back to the surrounding assembly (concrete or windows) with up-facing, horizontal tile and exposed mortar joints. These types of assemblies are prone to water infiltration at the interface joint and through the mortar joints and could be a part of the cause for the efflorescence discussed above.

This condition was diagnosed in previous reports and treated at the base tile with a post-installed prefinished sheet metal flashing that covers the up-facing tile and extends down the face of the tile approximately 3

inches. This flashing has joints at approximately 10' on center that are addressed with a butt joint and underlying splice plate. While the flashing does appear to be effective at covering the up-facing tile and joints, it does not appear to be adequately performing the intended job of shedding the water from the building and preventing water from reaching the up-facing tile. Gaps in the splices were observed as well as flashing that is back-pitched toward the building; thereby resulting in a condition of ponding water atop the flashing.

At the keystone tile, this condition was also diagnosed; however, a sheet metal flashing was not installed at this condition. The lack of a sheet metal flashing at these joints has resulted in signs of deterioration/erosion and moss growth, indicating excessive water infiltration over time. It appears that this condition could be contributing to the water infiltration discussed in the Ribbon Windows section.

*Deteriorated Sealant and Expansion Joints*
The sealant spanning the expansion joints is showing advanced signs of both adhesive and cohesive failure throughout the building.

At the keystone tile, the interface between the tile assembly and the surrounding concrete is addressed with a sealant joint. The sealant has been deteriorating over time through a combination of adhesive and cohesive sealant failure and has reached its useful life expectancy.

## Concrete:

78. Concrete with Elastomeric Coating (beige and red)

**Types of Deterioration**
*Cracking*

79. Concrete Cracking

80. Concrete Cracking

On the subject building, cracking of concrete on the exposed surfaces of the concrete wall appears to be caused by the expansion of corroded reinforcing steel within the concrete. When steel corrodes, it expands up to eight to ten times its original size, and exerts enormous pressure on the surrounding concrete, causing portions of it to dislodge or crack. Steel corrosion is caused by the penetration of water which occurs when the steel reinforcing is too close to the surface of the concrete, and there is not adequate coverage to protect it. As the crack or spall opens, more water is introduced, accelerating the corrosion rate.

*Spalling*

"Spalling" is a condition where fragments of concrete become dislodged from the surface of a concrete structure. When steel corrodes, it expands up to eight to ten times its original size, and exerts enormous pressure on the surrounding concrete, causing portions of it to dislodge or crack. Steel corrosion is caused by the penetration of water which occurs when the steel reinforcing is too close to the surface of the concrete, and there is not adequate coverage to protect it. As the crack or spall opens, more water is introduced, accelerating the corrosion rate.

81. Concrete Spalling

82. Concrete Spalling

83. Concrete Spalling

*Deteriorated Elastomeric Coating*

Deterioration of elastomeric coatings occurs as a result of either erosion of the coating due to repeated weathering over time, or the effects of building movements/deterioration affecting the underlying substrate, or damage to the coating due to maintenance operations.

Elastomeric coatings also have the tendency to collect dirt due to the migration of plasticizers to the surface of the coating and the nature of the coating to have several surface pores that can hold dirt.

84. Concrete Elastomeric Paint Failure

**Condition of Exterior Assemblies**

Overall, the concrete walls throughout the building are in good condition with minimal deterioration throughout. There are isolated conditions that are noted on the exterior elevation maps and described as follows:

*Cracking*

At one bay on the north and south facades, a cracking pattern appeared to consistently occur in the concrete panels above and below a punched window opening at approximately 10-12" off the jambs. The exact cause of the cracking appears to be corrosion of underlying reinforcing steel. If the cracking was caused by building movements, the cracks would have extended to the window openings and been oriented in an approximately 45° pattern signaling shear cracking. However, all cracks were nearly vertical in orientation and, except for one location, did not extend to the window openings.

In all cases observed, the cracking has translated through the elastomeric coating, thereby allowing potential water infiltration behind the coating and into the concrete. This potentially accelerates the corrosion, creating a vicious cycle where the enlargement of the crack could accelerate creating an unstable condition over time.

*Spalling*

Similar to the cracking conditions, spalls of the concrete were observed in isolated locations. Typically this type of spalling occurs as a result of deterioration of the underlying reinforcing steel. Sounding of the spall areas did not reveal that these areas were at risk of falling off the building and appeared to be well secured to the building.

However, one location at the east elevation, fourth floor showed a significant spall. The spall, measuring approximately 8"x6", occurred at a vertical rustication joint at the base of the exposed concrete where the flashing is attached above the tile. The concrete was loose and removed by TFG to prevent potential harm if it fell to the roof level below. It was observed that the underlying steel was corroded and presumably pushed the concrete piece off.

*Deteriorated Elastomeric Coating*

Overall, the elastomeric coating on the concrete was in fair condition but starting to show signs of reaching its useful life expectancy. Cracks through the coating were discussed above under "Cracking" and appear to be attributed to the underlying cracked concrete. Other deterioration in the coating appears to be scuffs and scrapes in the coating attributable to maintenance operations on the building. These scuffs and scrapes do not appear to be contributing to any deterioration of the underlying substrate.

We found the elastomeric coating to generally be dirty. As mentioned above, these types of coatings have a tendency to attract and hold dirt on the surface and in surface pores throughout the surface of the coating. Notable footprints were observed around the windows, presumably from window washers utilizing a boatswain's chair to access the exterior.

## Stucco:

85. Stucco Capitols at East and West Elevations

86. Stucco Ribbon / Garland at North and South Elevations

**Types of Deterioration**

*Cracking*
Cracking in the stucco appears to be caused by thermal movements or shrinkage of the stucco over time.

87. Stucco Cracking

*Omitted Sealant Joints*
At the vertical joints in the stucco near the corners, ¾" gaps were observed to be open, directly exposing the underlying building paper.

88. Stucco Omitted Sealant Joints

*Deteriorated Elastomeric Coating*
Deterioration of elastomeric coatings occurs as a result of either erosion of the coating due to repeated weathering over time or the effects of building movements/deterioration affecting the underlying substrate, or damage to the coating due to maintenance operations. Elastomeric coatings also have the tendency to collect dirt due to the migration of plasticizers to the surface of the coating and the nature of the coating to have several surface pores that can hold dirt.

**Condition of Exterior Assemblies**
Overall, the stucco areas throughout the building are in very good condition with minimal deterioration throughout. There are isolated conditions of cracking in various locations that are noted on the exterior elevation maps and described as follows:

*Cracking*
In a few locations, the cracking of the stucco appears to be caused by thermal movements

or shrinkage over time. The cracking is no more than hairline in all locations. Stucco, like all cementitious-based systems, is expected to exhibit cracking in some form, be it from shrinkage, building movements, or other mechanisms.

In all cases observed, the cracking has translated through the elastomeric coating, thereby allowing potential water infiltration behind the coating and into the stucco. This potentially accelerates any corrosion, creating a vicious cycle where the enlargement of the crack could accelerate creating an unstable condition over time.

*Omitted Sealant Joints*

Working in the favor of the system, at all corners a ¾" gap is present exposing the underlying drainage plane. The original documents show that these gaps were to be sealed; however it is theorized that the lack of sealant at these locations improves the drainage such that it does not get trapped within the system and accelerate deterioration. The underlying building appears to be in fair condition without tears or cracking; therefore it appears to be performing as intended. In light of this, it is recommended that a sealant joint be provided at the vertical gaps to prevent excessive water infiltration and protect the underlying building paper to direct exposure. The bottom horizontal joints should be left open to allow for drainage.

*Deteriorated Elastomeric Coating*

Overall, the elastomeric coating on the stucco was in fair condition but starting to show signs of reaching its useful life expectancy. Cracks through the coating were discussed above under "Cracking" and appear to be attributed to the underlying cracked stucco. Other deterioration in the coating appears to be scuffs and scrapes in the coating attributable to maintenance operations on the building. These scuffs and scrapes do not appear to be contributing to any deterioration of the underlying substrate.

We found the elastomeric coating to generally be dirty, similar to the coating on the concrete. As mentioned above, these types of coatings have a tendency to attract and hold dirt on the surface and in surface pores throughout the surface of the coating. Notable footprints were observed around the windows, presumably from window washers utilizing a boatswain's chair to access the exterior.

## Interior Finishes & Features:

**Interior Finishes & Features**

From the interior all perimeter walls appear as solid patterned with square windows. Curtain walls, spandrel glass, and ribbon windows are not distinguishable from punched windows. The majority of the curtain wall as seen from the exterior is actually spandrel glass and there is a solid framed wall behind.

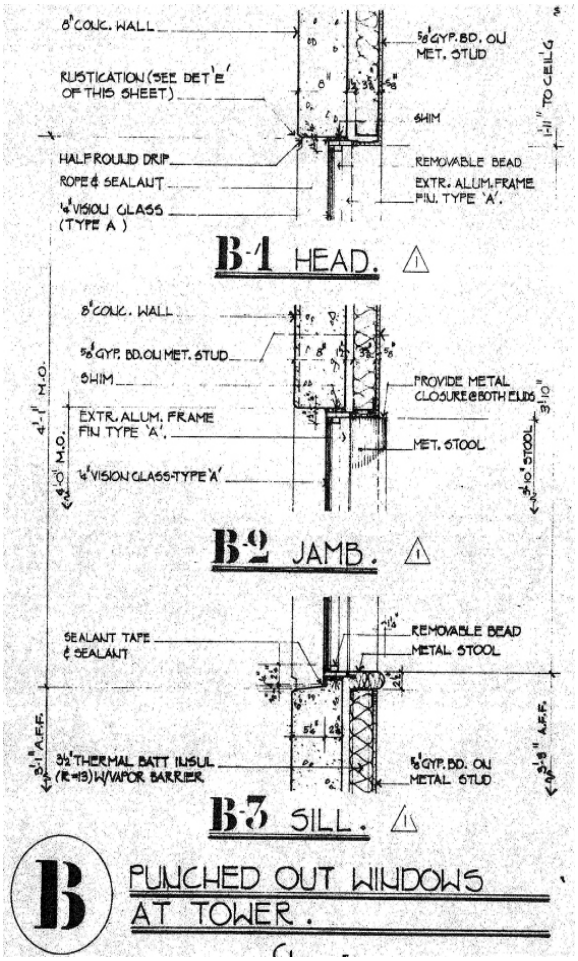



**FIGURE 1 PUNCHED WINDOW TYPICAL DETAIL**

As noted the glazing systems consist of aluminum frame with ¼" thick single pane tinted glass. These assemblies are inserted into the rough opening with the remaining gap between the window frame and the wall filled with a backer rod and sealant.

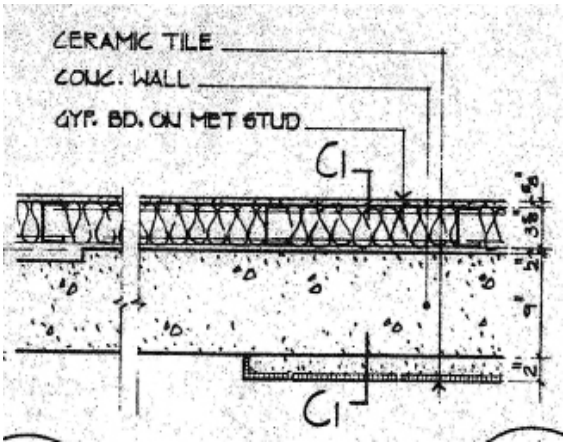



**FIGURE 2 TYPICAL EXTERIOR WALL ASSEMBLY**

The typical exterior wall assembly for the building is shown in the original detail above. This assembly is very typical for one and two story warehouse type buildings, but is rarely used in high rise construction.

There are several inherent issues with utilizing this wall system for high rise construction, including:

1. The structural connection between the concrete floor slab and wall does not allow for slab deflection and movement separate from the rigid exterior wall.
2. Thermal expansion and contraction of the exterior concrete wall is locked in by the concrete floors.
3. Thermal / Heat transfer from the exterior wall to concrete floor slabs.
4. The exterior concrete wall is the weather barrier, the **single line of**

**defense** against moisture and air penetration. Once this line is breached, moisture is in the building.

Vapor Barrier

At the time of construction, the basic philosophy for the control of moisture was to install the vapor barrier on the interior side of the wall. This would block moisture vapor in the interior occupied spaces form entering the wall assembly. Moisture vapor that has penetrated the vapor barrier will condense on any surface that is colder than the dew point.

In the Portland Building, the vapor barrier is the vinyl wall covering and the cold surface is typically the inside face of the exterior concrete wall or the back on the spandrel panels.

Interior vapor barriers are inherently difficult to maintain. The barrier must be continuous and wall penetrations must be sealed. This level of construction quality is difficult to achieve and maintain over the life of the building.

The practical result is that moisture does penetrate the wall, and condenses on cold elements in the wall assembly. The vapor barrier then serves as a barrier trapping moisture in the wall cavity and not allowing the cavity to 'dry out'. The wall assembly is further compromised by the inclusion of exterior water from the failed sealants, joints and other sources.

Continued exposure to these conditions has caused the metal stud framing to corrode, fiberglass batt insulation to lose insulation 'R' value and the gypsum wall board to decompose. It also leads to development of mold in the wall system.

All of these conditions have been encountered in the Portland Building in many locations.

Ribbon Windows

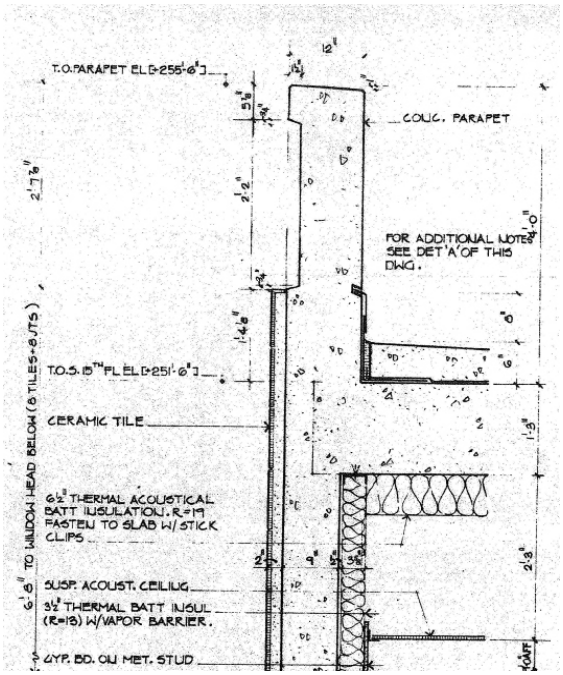



**FIGURE 3 CERAMIC TILE AT RIBBON WINDOWS**

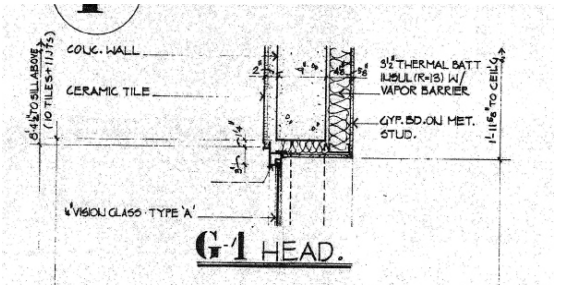



**FIGURE 4 RIBBON WINDOW HEAD DETAIL**

The ribbon windows installed on the 10th through 14th floors present an additional problem. These windows are set into the red ceramic tile capitol. As noted in Photo 41 the top of the tile is not flashed. Only a bead of sealant protects the top of the tile from water infiltration into the wall assembly behind. This sealant has failed and the resulting leaks have caused extensive damage to the exterior

tile installation, ribbon window assemblies and interior finishes.

89. 14th FLOOR WEST ELEVATION

90. 14TH FLOOR WEST WINDOW HEAD

Aluminum Sills

The aluminum sill plates have also created an ongoing problem with the building occupants. These sills are in direct contact with the aluminum window frames. This allows direct heat or cold transfer from the frame to the sill. The aluminum sills can be 20 to 25 degrees colder or hotter than the room temperature. On January 17th, 2013 the outside air temperature was about 28 degrees, interior window frame temperature was about 38 degrees, the sill temperature was 40 to 44 degrees and the room temperature was about 68 degrees. This would be similar to sitting next to an open refrigerator.

Summer conditions could be more extreme due to radiant heat gain at the black aluminum sill plates.

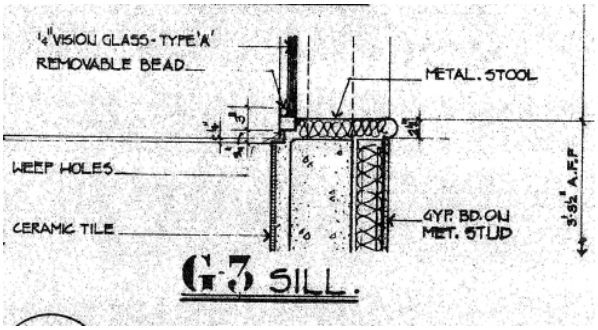



**FIGURE 5 TYPICAL ALUMINUM SILL**

# *Interior Destructive Investigation*

# *Interior Destructive Investigation*

The further understand and assess the existing conditions within the exterior wall assemblies interior testing was recommended. In conjunction with the building structural assessment testing, interior destructive investigation was completed at the 4th, 7th, 10th and 14th floors. This process included: identifying test locations based on preliminary observations, dismantling the interior wall assembly, documentation of the existing conditions and then repairing the wall to original condition.

Each location provided information on 'as-built' conditions the further confirmed the initial assessments.

Test Location 4.10

This test location is located on the fourth floor at the south elevation. It is at the bottom of one of tall slot curtain wall assemblies.

91. Test Location 4.10 (4th floor, south)

Observed extensive water damage to interior finishes, vinyl wall covering is peeling away, GWB has deteriorated. Floor has been saturated so often that carpet was removed and vinyl floor covering was installed for easy clean-up of standing water.

The wall framing showed extensive signs of water and moisture. The concrete floor slab was saturated and there was standing water in the curtainwall sill track

92. 4.10 Sill Track Standing Water

93. 4.10 Water Stains

94. 4.10 Peeling Vinyl Wallcovering

Test Location 7.10

This test location is located on the seventh floor at the north elevation. It is at the mid span of one of tall slot curtain wall assemblies.

95. Test Location 7.10 (7th floor, south elevation)

Observed extensive water damage to interior finishes, vinyl wall covering is peeling away, GWB has deteriorated. Water stains were noted on curtainwall support brackets.

Moisture stains were also noted on the back of the spandrel panels.

It was also noted that fire safing or mineral wool batt insulation normally required at exterior walls to separate one floor from the next for fire separation was not installed in this location.

At the time of observation the outside are temperature was approximately 29 degrees. The inside air temperature was approximately 68 degrees. The temperature of the aluminum sill was between 42 and 46 degrees +/-.

96. 7.10 Water Stains at Connection Plates

97. 7.10 Water Stains at Connection Plates

Test Location 9.10

This test location is located on the ninth floor at the north elevation. It is at the mid span of one of tall slot curtain wall assemblies.

98. 9.10 (9th floor, north elevation)

Observed extensive water damage to interior finishes, vinyl wall covering is peeling away, GWB has deteriorated. Water stains were noted on curtainwall support brackets.

Moisture stains were also noted on the back of the spandrel panels.

It was also noted that fire safing or mineral wool batt insulation normally required at exterior walls to separate one floor from the next for fire separation was not installed in this location.

At this location the vertical expansion joint was exposed. The curtainwall frame is not cut completely through. This installation does not allow for thermal expansion of the curtain wall frame.

99. 9.10 Moisture Stains on Spandrel Panel

100. 9.10 Expansion Detail

Test Location 14.10

This test location is located on the fourteenth floor at the west elevation. It is at top level of horizontal ribbon windows.

101 Test Location 14.10 (14th floor, west elevation)

Observed extensive water damage to interior finishes, vinyl wall covering is peeling away, GWB has deteriorated. Due to the amount of deterioration, it was determined to repair the head, jamb and sill installation, however, due to the failure of the exterior red ceramic tile installation, this window assembly will continue to leak.

Water damage from leaks in the exterior ceramic tile at window head was significant.

102 14.10 Head at South End.

103 14.10 Head at North End

104 14.10 Window Head

105. 14.10 Window Sill at South End


106. 14.10  Window at Adjacent Window


107. 14.10  Window at Adjacent Window

# *Structural Assessment*

## *Structural Assessment*

The structural assessment involved three main parts that included physical investigation and testing, numerical analysis, and development of a conceptual rehabilitation scheme. The physical investigation and testing allowed for a more accurate understanding of existing material condition and strength. These strengths were then used in the numerical analysis of the existing structure to determine an element's acceptability when compared to applied code requirements. Once the deficiencies were identified, several rehabilitation schemes were discussed with the City and the design team. The pros and cons of each scheme were weighed against each other, and the final chosen upgrade scheme was decided upon.

The physical investigation and testing involved non-destructive and destructive sampling of several different types of structural elements from throughout the building. Ground penetrating radar (GPR, non-destructive) scans were performed on concrete slabs/joists/beams, walls, and columns. The scans allowed for verification of the existing concrete element thicknesses and verification of the reinforcing bar placement within those elements. Concrete cores were removed (destructive) from existing slabs/joists/beams, walls, and columns. The cores were tested to determine the concrete compressive strength for verification with the existing documents and use in the numerical analysis. Reinforcing bars were removed (destructive) from existing concrete slabs/joists/beams, walls, and columns. The bars were tested to determine their yield and ultimate tension strengths for verification with the existing documents and use in the numerical analysis.

The gravity support framing analysis was conducted in accordance with the *2010 Oregon Structural Specialty Code* (*2010 OSSC*). The building's main function is office space for many of the departments and bureaus for the City of Portland. Dead loads were obtained from the original structural drawings. Live loads were determined per the *2010 OSSC*, given the use, and they consisted of office, corridor, and storage. Applied loads were compared against the code-allowed element capacities to determine their acceptability. Structural elements checked include concrete slabs/joists/beams, walls, columns, and footings.

The lateral seismic analysis was performed using *ASCE 41-06, Seismic Rehabilitation of Existing Buildings* (*ASCE 41*). *ASCE 41* is a nationally recognized document that is specifically intended for developing rehabilitation schemes for existing buildings. Current prescriptive codes do not recognize or permit the use of older seismic systems, and therefore they do not have provisions for analysis of many existing building structural elements. *ASCE 41* allows the recognition of these existing elements, and their reduced capacity, and this enables the analysis to more appropriately determine the expected seismic performance of an existing building. This study analyzed the existing structure for

the Basic Safety Objective (BSO). The BSO is a rehabilitation objective that is intended to produce a structure that can be expected to have similar performance to a building designed per current prescriptive code. The BSO has two checks: one for the Basic Safety Earthquake 1 (BSE-1) hazard at the Life Safety (LS) performance level, and a second for the Basic Safety Earthquake 2 (BSE-2) hazard at the Collapse Prevention (CP) performance level.

Based on the deficiencies found in the lateral analysis, a conceptual rehabilitation scheme was developed. This recommended seismic upgrade is based on discussions with the City and has been coordination with the design team. The rehabilitation scheme was developed per current code, the *2010 OSSC*, such that the resulting upgraded building would structurally perform similar to a new building. Compared to other options that were discussed with the City and the design team, the moment frame option was identified as providing the most benefits and the least amount of drawbacks

.

# *Historic Designation Analysis*

# *Historic Designation Analysis*

The Portland Building is individually listed on the National Register of Historic Places under Criterion C for its architecture and Criterion Consideration G for resources under 50 years old. The Period of Significance is 1982 – 1985 (date of completion to installation of Portlandia statue). Major exterior alterations to designated resources in the City of Portland are subject to review by the Portland Historic Landmarks Commission.

Findings and approaches to treatment were presented to the Portland Historic Landmarks Commission through a preliminary of public briefing on November 26, 2012.

The briefing included the following discussion points

Background

- The City of Portland held a design competition in 1979 chaired by Philip Johnson.
- The project was awarded to up and coming architect Michael Graves. Graves's final design was based on his conceptual ideas, energy codes of the time, and the City's relatively low budget.
- The building was officially listed on the National Register of Historic Places in 2011. It is cited as nationally significant as a notable work by master architect Michael Graves and as an early and influential work of Post-Modern Classicism.
- It is identified as "one of the first large-scale manifestations of a new architectural style coming on the heels of the Modern movement" qualifying for listing under special consideration for properties that have achieved significance in the past 50 years.

Modern / Post-Modern Era Construction

- Approval Criteria for historic review as set forth by Landmarks Commission and how this criteria could be applied to Post-Modern design concepts.

History of Repairs

- Timeline and brief discussion of past studies and repairs.

Current Project

- Project goal and strategy to address building deficiencies.
- Findings to date for each of the primary exterior elements and assemblies.

Treatment Approaches

- Approach A – Required

Stabilization and repairs to arrest current water infiltration and/or correct current deficiencies. Does not address the root causes or represent a long-term solution.

- Approach B – Recommended

  Holistic approach to address systemic deficiencies and failures that have led to chronic water infiltration and deterioration with the intent of addressing root causes and providing long-term results.

- Approach C – Improvements

  Upgrades that can be incorporated in addition to Option B with the intent of further improving the quality of the interior environment and/or building efficiency and maintenance.

This briefing was intended to introduce the Historic Landmarks Commission to the project. Reviewer's comments were minimal at the time.

- New assemblies should match exiting exterior profiles, dimensions, and locations within the assembly as closely as possible.

The full November 26, 2012 briefing power point presentation is included in the appendix, Item C.

# *Treatment Approaches*

# *Treatment Approaches*

The most appropriate approach to rehabilitation may vary by material/assembly. Therefore the following three approaches have been developed to illustrate options for temporary stabilization/preservation, holistic treatment/rehabilitation, and improvements beyond.

These approaches are consolidated into a 'Treatment Recommendations' matrix included in the assessment.

**Option A: Required**

Essentially a preservation-based approach, treatments outlined under Approach A is those required for stabilization and to address current water infiltration and/or correct current deficiencies. These treatments do not address the root causes or represent long-term solutions. Most will need to be redone every 5 to 10 years and will not effectively stop all water infiltration.

**Option B: Recommended**

Treatments identified under rehabilitation-based Approach B are holistic and address systemic deficiencies and failures that have led to chronic water infiltration and deterioration. These treatments are intended to focus on root causes and provide long-term solutions. Improvements to assembly design and installation that directly affect the performance and success of the repair or replacement are included in Approach B. Recommendations are in line with the Secretary of the Interior's Standards for Rehabilitation.

**Option C: Improvements**

Treatments suggested under Approach C are upgrades that can be incorporated in addition to Approach B. These are intended to further improve the quality of the interior environment and/or building efficiency and maintenance where the opportunity exists in relation to Approach B repairs.

## *Treatment Approaches by Assembly*

The following preliminary design details are intended to further describe the proposed solutions to the various conditions. Each detail has the **dual line of defense** hi-lighted.

### Glazing Systems

**'Punched' Window Openings:**

<u>Option A - Required Repairs</u>

These repairs address current damage, mitigate water infiltration and improve aesthetics; however they do not address overall system deficiencies in the punched window installation. Reoccurrence of the repaired conditions is likely without addressing the system deficiencies.

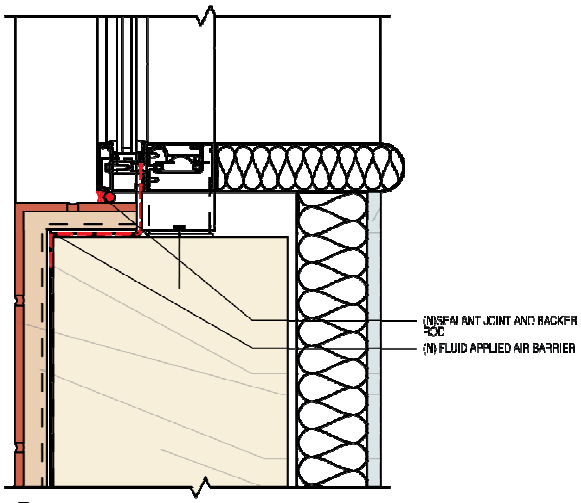
- Remove and replace existing perimeter sealant joints with new silicone sealant; color to match existing.
- Replace existing glazing gaskets with new silicone gaskets; color to match existing.
- Seal all gaps in the storefront aluminum frames

- Replace discolored or incorrectly colored metal panels.

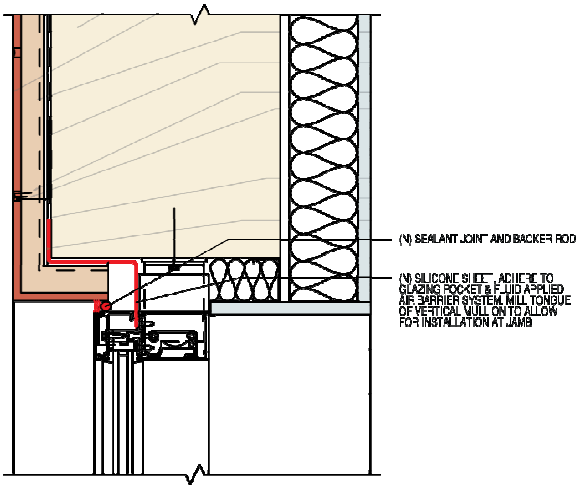
<u>Option B – Recommended</u>

The preferred method provides a holistic approach to addressing systemic deficiencies and failures that have led to chronic water infiltration and hazardous conditions.

In order to address the observed deterioration and chronic water infiltration that have plagued the building at these assemblies set within tile, the following **dual line of defense** approach is recommended for a long-term.




B12 PUNCHED OPENING SILL @ TILE - OPTION B




B11 PUNCHED OPENING HEAD @ TILE - OPTION B

- Remove the existing punched window assemblies including anchorage and associated sheet metal flashings.
- Remove two courses of tile all around the window rough opening to allow for the installation of appropriate flashing on the face of the concrete substrate. Remove the tile, setting bed, lath and polyethylene weather-barrier down to the existing concrete substrate.
- Any removed tile that is salvageable can be reused at the owner's discretion; however past investigations have revealed that salvaging the existing tile is difficult due to the brittle nature of the tile.
- Apply a fluid-applied flashing atop the concrete substrate for the entire perimeter of the rough opening.
- Install a new thermally broken curtain wall-type system with custom snap cap to match the profile and dimensions of the existing window system. Color, finish and location to match existing.
- New curtain wall system to incorporate tinted dual insulated glazing with laminated blast performance interlayer units to

match existing aesthetics but provide increased energy performance.
- Install silicone sheet to provide the primary air and water seal between the window system and surrounding fluid applied flashing.
- Install a drainage plane composed of a pre-molded drainage mat with integral lightweight breathable filter fabric.
- Install stainless steel expanded metal lath through drainage plane and air barrier and apply setting bed.
- Install new glazed ceramic tile of same color, size, texture and gloss as existing tile.
- Install new sealant joint between the pressure plate of the curtain wall system and newly installed tile.

In order to address the observed deterioration and chronic water infiltration that have plagued the building at these assemblies set within the concrete areas, the following is recommended for a long-term solution for punched windows set within the concrete areas:

- Remove the existing punched window assemblies including anchorage.
- Apply new elastomeric coating atop the concrete for the entire rough opening to provide for a fresh, clean surface for the application of sealant.
- Install a new thermally broken curtain wall-type system with custom snap cap to match the profile and dimensions of the existing window system. Color, finish and location to match existing.
- New curtain wall system to incorporate tinted dual insulated glazing units with laminated blast performance interlayer to match existing aesthetics but provide increased energy performance.
- Install dual-sealant joints to provide the primary and secondary air and water seal between the window system and surrounding concrete assembly.

Option C – Improvements

In addition to the base recommendation in Approach B, the following will improve the performance of the assembly and the comfort of the building occupants with little to no effect on the exterior appearance of the building.

- Operability. Consider making some windows operable for improved indoor air quality. This upgrade should be in coordination with improvements or alterations to the building's HVAC system.

- Technology. Modern glass technology may allow for improved day-lighting, efficiency, and transparency while maintaining the exterior appearance.

**Storefront Assemblies**

Option A - Required Repairs

The following recommendations are effective long-term solutions for storefronts protected within the loggia. These repairs address current damage, mitigate water infiltration and improve aesthetics; however they do not address overall system deficiencies in the tile installation. Reoccurrence of the repaired conditions is likely without addressing the system deficiencies.

- Remove and replace existing perimeter sealant joints with new silicone sealant; color to match existing.

- Replace existing glazing gaskets with new silicone gaskets; color to match existing.
- Seal all gaps in the storefront aluminum frames
- Replace discolored or incorrectly colored metal panels.

Option B – Recommended

The preferred method provides a holistic approach to addressing systemic deficiencies and failures that have led to chronic water infiltration and hazardous conditions.

In order to address the observed deterioration and chronic water infiltration that have plagued the building at these assemblies, the following is recommended for a long-term solution:

- Where storefront areas abut tile, remove two courses of tile around the perimeter of the window rough opening to allow for the installation of appropriate flashing on the face of the concrete substrate. Remove the tile, setting bed, lath and polyethylene weather-barrier down to the existing concrete substrate.
- Any removed tile that is salvageable can be reused at the owner's discretion; however past investigations have revealed that salvaging the existing tile is difficult due to the brittle nature of the tile.
- Apply a fluid-applied flashing atop the concrete substrate for the entire perimeter of the rough opening.
- Install a new thermally broken storefront system with custom snap cap to match the profile and dimensions of the existing window system. Color, finish and location to match existing.
- New storefront system to incorporate tinted dual insulated glazing units with laminated blast performance interlayer to match existing aesthetics but provide increased energy performance.
- Install silicone sheet to provide the primary air and water seal between the window system and surrounding fluid applied flashing.
- Install new sheet metal flashing at the head and sill to direct water out of the tile assembly.
- Install a drainage plane composed of a pre-molded drainage mat with integral lightweight breathable filter fabric.
- Install stainless steel expanded metal lath through drainage plane and air barrier and apply setting bed.
- Install new glazed ceramic tile of same color, size, texture and gloss as existing tile.

Option C – Improvements

In addition to the base recommendation in Approach B, the following will improve the performance of the assembly and the comfort of the building occupants with little to no effect on the exterior appearance of the building.

- Technology. Modern glass technology may allow for improved day-lighting, efficiency, and transparency while maintaining the exterior appearance.

**Curtainwall Assemblies:**

Option A - Required Repairs

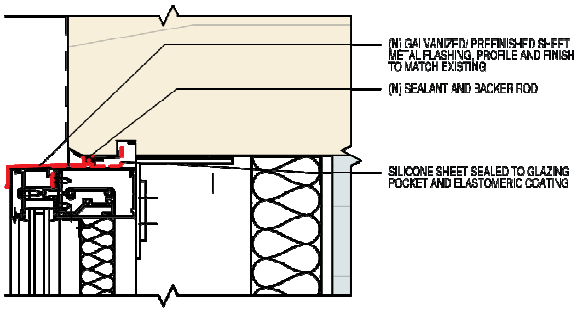
Due to the severe deterioration of the curtainwall assemblies and systemic nature of the deficiencies, remediation of these systems is not considered a viable option to arrest water infiltration in the long-term.

Option B – Recommended

The preferred method provides a holistic approach to addressing systemic deficiencies and failures that have led to chronic water infiltration and hazardous conditions. In addition the existing installation is extremely energy in-efficient and contributes to the generally poor working environment.

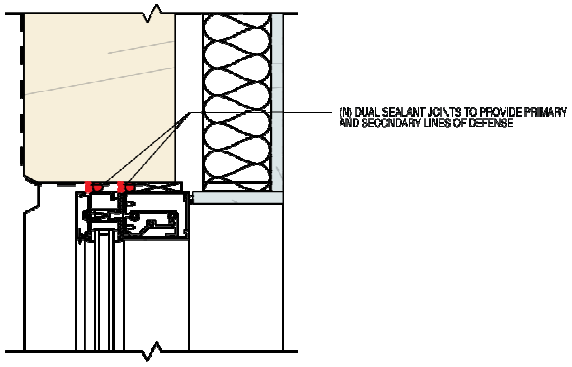
In order to address the observed deterioration and chronic water infiltration that have plagued the building at these assemblies, the following **dual line of defense** approach is recommended for a long-term solution:
The curtainwall head condition at the tenth floor typically projects forward 3" +/- from the concrete above. This projection has sheet metal flashing and sealant as the water barrier. At the flashing joints the sealant has failed, water is leaking into the assembly and then the building.

- Remove existing curtainwall.
- Install new curtainwall assembly.
- Install primary seal with silicone membrane.
- Install secondary seal with sheet metal flashing and sealant.

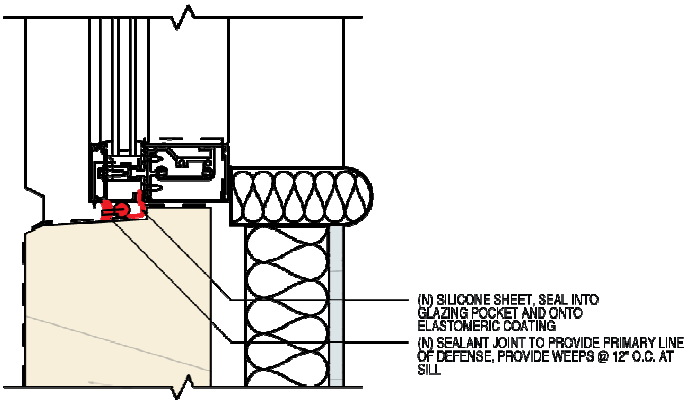



B9 CURTAIN WALL - HEAD - OPTION B

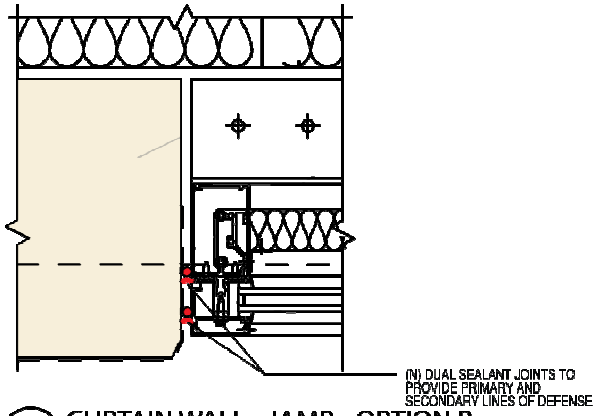
At typical curtainwall installations




B4 CURTAIN WALL HEAD (JAMB SIM.) @ CONC. OPENING




B5 CURTAIN WALL SILL @ CONC. OPENING

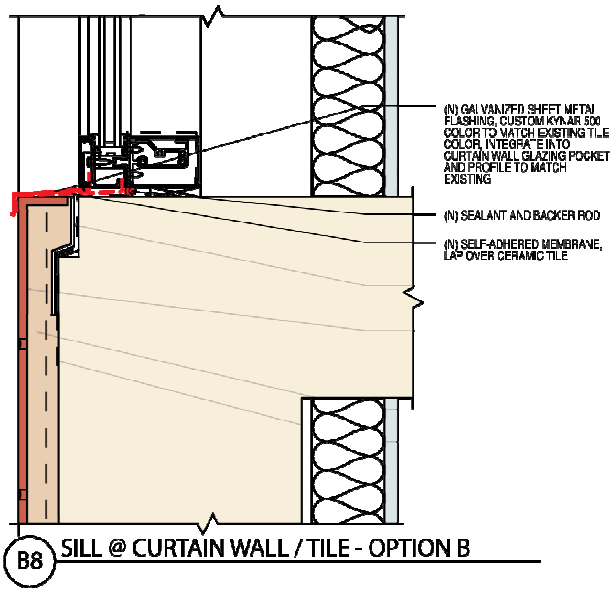



B10 CURTAIN WALL - JAMB - OPTION B

- Remove existing decorative ribbon / garland element that spans across each of the large curtain wall areas. Removal is required for these areas to facilitate access for any method of

repair/replacement of the curtain wall.

- Remove the existing curtain wall assemblies including anchorage and associated sheet metal flashings.
- Remove up-facing, return course of tile below the window rough opening to allow for the installation of appropriate flashing on the face of the concrete substrate. Remove the tile, setting bed, lath and polyethylene weather-barrier down to the existing concrete substrate.
- Any removed tile that is salvageable can be reused at the owner's discretion; however past investigations have revealed that salvaging the existing tile is difficult due to the brittle nature of the tile.
- Apply a fluid-applied flashing atop the concrete substrate at the sill.
- Apply new elastomeric coating atop the concrete at the head and sill to provide for a fresh, clean surface for the application of sealant.
- Install a new thermally broken curtain wall system with custom snap cap to match the profile and dimensions of the existing window system. Color, finish and location to match existing.
- New curtain wall system to incorporate tinted dual insulated glazing units with laminated blast performance interlayer to match existing aesthetics but provide increased energy performance.
- Install silicone sheet at the head to provide the primary air and water seal between the window system and concrete above.
- Install a primary and secondary sealant joint at the jambs to provide two lines of defense against air and water infiltration. The primary line of defense (inner sealant joint in following sketches) to join with silicone sheet at head and sealant joint at sill to maintain continuity.
- Install sealant joint at sill to provide primary seal against air and water infiltration.
- Install new sheet metal flashing at the head and sill to direct water out of and away from the curtain wall assembly. The sheet metal flashing at the sill to be continuous with the sheet metal flashing recommended for the top of the tile as described in the "Ceramic Tile" section, below.
- Beneath the sill area, install a drainage plane composed of a pre-molded drainage mat with integral lightweight breathable filter fabric.
- Install stainless steel expanded metal lath through drainage plane and air barrier and apply setting bed.
- Install new glazed ceramic tile of same color, size, texture and gloss as existing tile.




Option C – Improvements

In addition to the base recommendation in Approach B, the following will improve the performance of the assembly and the comfort of the building occupants with little to no

effect on the exterior appearance of the building.

- Operability. Consider making some windows operable for improved indoor air quality. This upgrade should be in coordination with improvements or alterations to the building's HVAC system.
- Technology. Modern glass technology may allow for improved day-lighting, efficiency, and transparency while maintaining the exterior appearance.
- Alter from interior. Open up framed wall behind curtain wall to increase visible glazing area without affecting the exterior appearance of the building. Employ previously mentioned new glass technologies.
- Other hidden improvements. Back pan and insulate at spandrel sections for increased protection against water infiltration.

**Ribbon Windows @ Red Tile Keystones:**

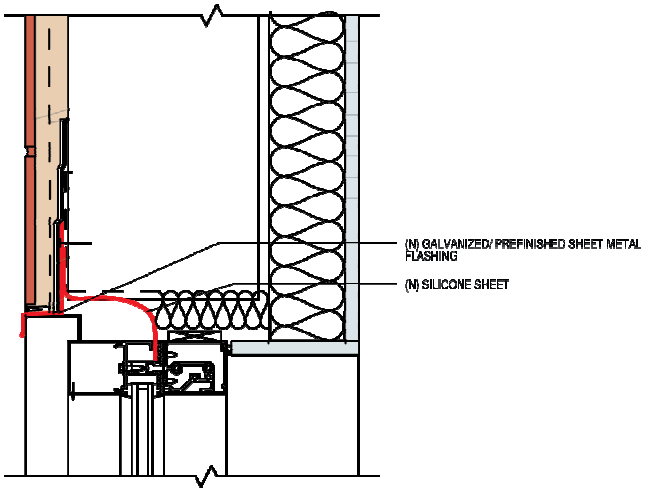
Option A - Required Repairs

Due to the severe deterioration of the ribbon window assemblies and systemic nature of the deficiencies, remediation of these systems is not considered a viable option to arrest water infiltration in the long-term.

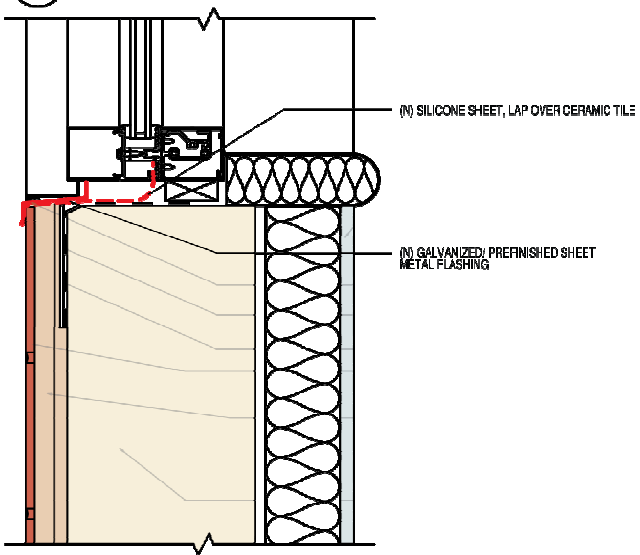
Option B – Recommended

The preferred method provides a holistic approach to addressing systemic deficiencies and failures that have led to chronic water infiltration and hazardous conditions.

In order to address the observed deterioration and chronic water infiltration that have plagued the building at these assemblies, the following **dual line of defense** approach is recommended for a long-term solution:




B6 RIBBON WINDOW - HEAD (JAMB SIM.) - OPTION B




B7 RIBBON WINDOW - SILL - OPTION B

- Remove the existing ribbon window assemblies including anchorage and associated sheet metal flashings.
- Remove two courses of tile above and below the window rough opening to allow for the installation of appropriate flashing on the face of the concrete substrate. Remove the tile, setting bed, lath and

polyethylene weather-barrier down to the existing concrete substrate.
- Any removed tile that is salvageable can be reused at the owner's discretion; however past investigations have revealed that salvaging the existing tile is difficult due to the brittle nature of the tile.
- Apply a fluid-applied flashing atop the concrete substrate for the entire perimeter of the rough opening.
- Install a new thermally broken curtain wall system with custom snap cap to match the profile and dimensions of the existing window system. Color, finish and location to match existing.
- New curtain wall system to incorporate tinted dual insulated glazing units with laminated blast performance interlayer to match existing aesthetics but provide increased energy performance.
- Install silicone sheet to provide the primary air and water seal between the window system and surrounding fluid applied flashing.
- Install new sheet metal flashing at the head and sill to direct water out of the tile assembly.
- Install a drainage plane composed of a pre-molded drainage mat with integral lightweight breathable filter fabric.
- Install stainless steel expanded metal lath through drainage plane and air barrier and apply setting bed.
- Install new glazed ceramic tile of same color, size, texture and gloss as existing tile.

Option C – Improvements

In addition to the base recommendation in Approach B, the following will improve the performance of the assembly and the comfort of the building occupants with little to no effect on the exterior appearance of the building.

- Operability. Consider making some windows operable for improved indoor air quality. This upgrade should be in coordination with improvements or alterations to the building's HVAC system.

- Technology. Modern glass technology may allow for improved day-lighting, efficiency, and transparency while maintaining the exterior appearance.

- Alter from interior. Open up framed wall behind curtain wall to increase visible glazing area without affecting the exterior appearance of the building. Employ previously mentioned new glass technologies.

**Tile Assemblies:**

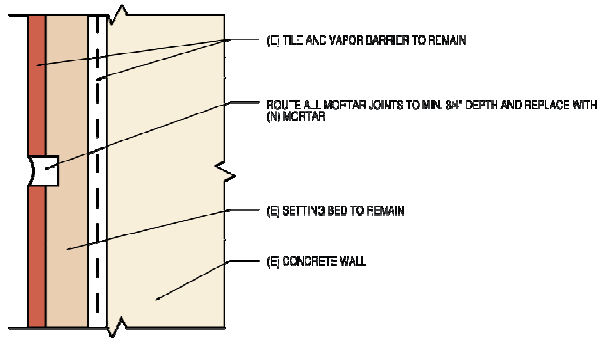
Option A - Required Repairs

These repairs address current damage, mitigate water infiltration and improve aesthetics; however they do not address overall system deficiencies in the tile installation. Reoccurrence of the repaired conditions is likely without addressing the system deficiencies.

*Cracked Tile*

- Remove existing cracked tiles down to sound setting bed material
- Using the current attic stock (if available) replace cracked tiles with new tiles using a tightly controlled Portland cement mortar formulation and bedding the tile fully to obtain full adhesion.

*Deteriorated Mortar Joints*




A1 TILE - REPOINTING - OPTION A

- Repoint deteriorated and/or cracked joints to prevent further deterioration of the joints and excess water infiltration.
- Repointing constitutes removal of existing material within the joints (to a depth sufficient to insure adequate bond with new material).
- Replace with a tightly controlled Portland cement mortar formulation.

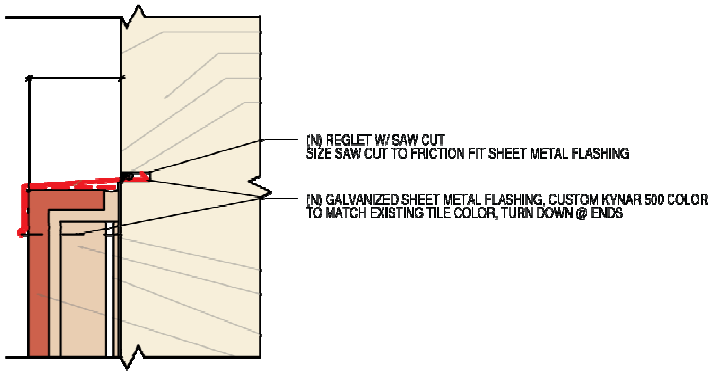
*Ineffective Re-pointing*

- Repoint deteriorated and/or cracked joints to prevent further deterioration of the joints and excess water infiltration.
- Repointing constitutes removal of existing material within the joints (to a depth sufficient to insure adequate bond with new material).
- Replace with a tightly controlled Portland cement mortar formulation.

*Exposed Horizontal Mortar Joints*

- At base tile:
  - Remove sheet metal flashing
  - Install high-temperature self-adhered membrane atop tile and interfacing with the concrete and windows systems above.
  - Install new sheet metal flashing with butt-splices and butyl sealant to ensure a long-term seal.

- At the keystone tile:
  - Remove existing sealant joints.
  - Install high-temperature self-adhered membrane atop tile and interfacing with the concrete above.
  - Install new sheet metal flashing with butt-splices and butyl sealant to ensure a long-term seal.




B3 TILE - FLASHING @ 11TH FLOOR TILE (OPTION B)

*Deteriorated Sealant and Expansion Joints*

- Sealant at Keystone tile
  - The procedures noted above under *Exposed Horizontal Mortar Joints* would address the deteriorated sealant at the top of the keystone element.
  - At the sides of the keystone, a new silicone sealant joint should be installed to seal the

edges from any potential water intrusion at these locations.

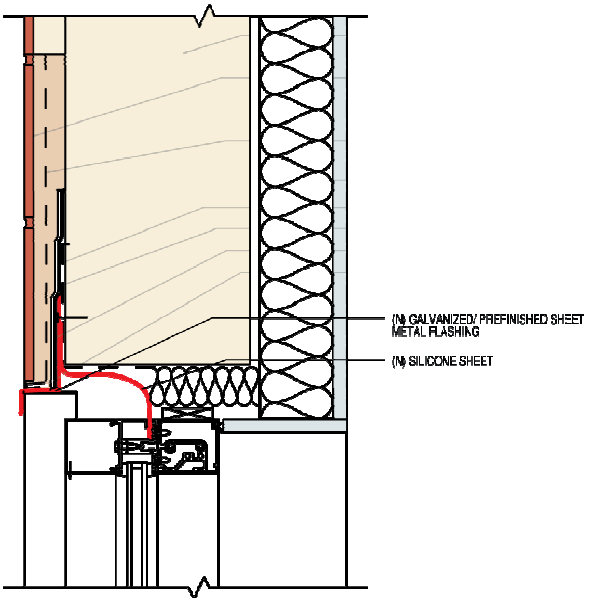
- Expansion Joints
    - Remove existing deteriorated sealant and associated backer rod, if any.
    - Rout joint to full depth of setting bed to allow for the entire tile assembly to expand and contract as a system.
    - Seal expansion joint with properly sized backer rod and sealant.

*Keystone tile at horizontal Ribbon Windows*

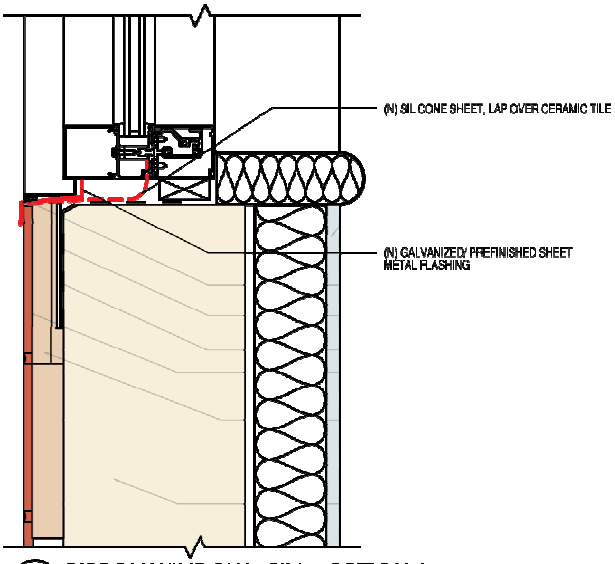
Option A - Required Repairs

- Head Condition: Due to the overall deterioration of the Ribbon Windows, it is recommended that they be replaced. In order to complete this replacement at least two courses of red keystone tile above and below will need to be removed.
    - Remove (2) courses of tile above ribbon windows.
    - Remove mortar bed.
    - Install fluid applied barrier.
    - Install self-adhered membrane and lap over silicone sheet.
    - Install drainage mat.
    - Install new mortar bed and ceramic tile to match.

- Sill Condition: Similar to the head detail.
    - Remove (2) courses of tile below ribbon windows.
    - Remove mortar bed.
    - Install fluid applied barrier.
    - Install self-adhered membrane and lap over silicone sheet.
    - Install drainage mat.
    - Install new mortar bed and ceramic tile to match.



A2 RIBBON WINDOW - HEAD (JAMB SIM.) - OPTION A



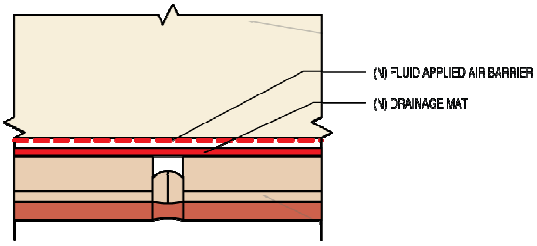
A3 RIBBON WINDOW - SILL - OPTION A

Option B – Recommended

In addition to addressing the Option A issues noted above, the preferred method provides a holistic approach to addressing systemic deficiencies and failures that have led to

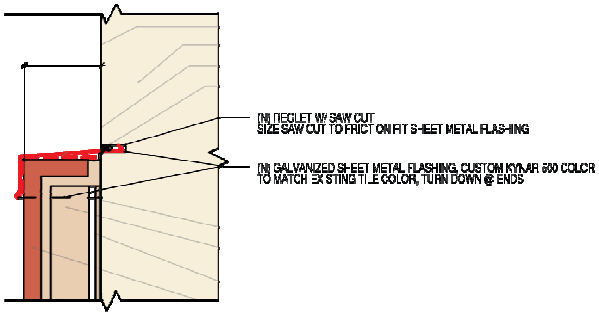
chronic water infiltration and hazardous conditions.

In order to address the chronic efflorescence in the long-term and properly address water infiltration issues at window perimeters, it is recommended to remove and replace the existing tile with a rain-screen type assembly that allows for a drainage plane behind the setting bed. In this scenario, we would recommend the following.

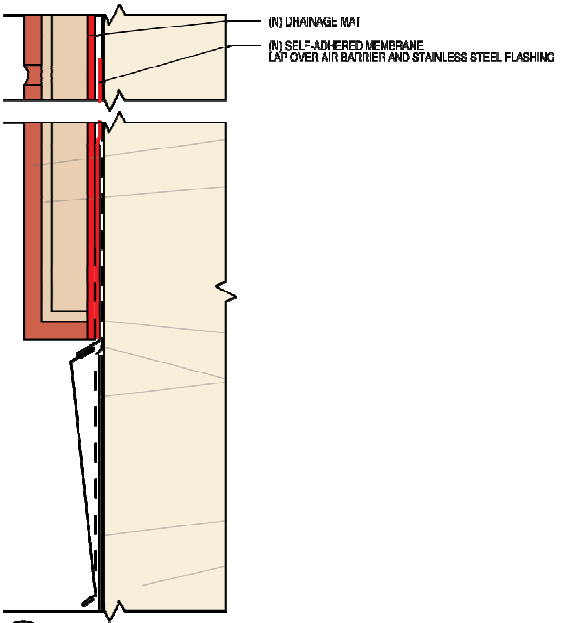



B2 TILE - EXPANSION JOINT - OPTION B

- Remove the tile, setting bed, lath and polyethylene weather-barrier down to the existing concrete substrate.
- Any removed tile that is salvageable can be reused at the owner's discretion; however past investigations have revealed that salvaging the existing tile is difficult due to the brittle nature of the tile.
- Apply a vapor permeable, fluid-applied, air barrier on the face of the concrete substrate with appropriate terminations and transitions to the windows, stucco, roofing and concrete to provide continuity of the air barrier across these transition areas.
- Install a drainage plane composed of a pre-molded drainage mat with integral lightweight breathable filter fabric.
- Install stainless steel expanded metal lath through drainage plane and air barrier and apply setting bed.
- Install new glazed ceramic tile of same color, size, texture and gloss as existing tile.




B3 TILE - FLASHING @ 11TH FLOOR TILE (OPTION B)




B1 TILE TO ROOF ASSEMBLY - OPTION B

**Concrete:**

Option A - Required Repairs

*Cracking*

- Rout out cracks to 1/4”-1/2” depth and width
- Repair crack with polymer modified, cementitious, low modulus, and non-sag repair mortar.
- Recoat concrete under recommendations in “Deteriorated Elastomeric Coating” below

*Spalling*

- Remove all spalled concrete until sound material is reached
- Clean and prepare exposed steel reinforcing bars
- Apply corrosion inhibitor/bonding agent to steel reinforcing bars
- Repair spalls with polymer modified, cementitious, low modulus, non-sag repair mortar
- Repair deep spalls by forming and pouring polymer modified, cementitious, low modulus, pourable, screed mortar
- Recoat concrete under recommendations in “Deteriorated Elastomeric Coating” below.

Option B – Recommended

In addition to the Option A repairs, it is recommended that the following be implemented to provide a full remediation of the concrete areas:

*Deteriorated Elastomeric Coating*

- Pressure wash all areas of the building to remove dirt and deposits
- Remove loose areas of elastomeric coating to sound material
- Apply new silicone elastomeric coating in color matching existing colors

**Stucco:**

Option A - Required Repairs

*Cracking*

- Rout out cracks to 1/4”-1/2” depth and width
- Repair crack with polymer modified, cementitious, low modulus, and non-sag repair mortar.
- Recoat concrete under recommendations in “Deteriorated Elastomeric Coating” below.
- NOTE: In order to replace the curtain wall assemblies on the north and south elevations, the existing stucco ribbon / garland panels will be required to be removed and the re-installed.

*Spalling*

- Remove all spalled concrete until sound material is reached
- Clean and prepare exposed steel reinforcing bars
- Apply corrosion inhibitor/bonding agent to steel reinforcing bars
- Repair spalls with polymer modified, cementitious, low modulus, and non-sag repair mortar.
- Repair deep spalls by forming and pouring polymer modified, cementitious, low modulus, pourable, screed mortar
- Recoat concrete under recommendations in “Deteriorated Elastomeric Coating” below.

Option B – Recommended

In addition to the Option A repairs, it is recommended that the following be implemented to provide a full remediation of the concrete areas:

*Deteriorated Elastomeric Coating*

- Pressure wash all areas of the building to remove dirt and deposits

- Remove loose areas of elastomeric coating to sound material
- Apply new silicone elastomeric coating in color matching existing colors

*Install Sealant Joints*

- Install sealant at the open vertical joints in the stucco to protect the underlying weather barrier from further deterioration. Horizontal joint are recommended to remain open to allow for drainage.

**Interior Finishes & Features:**

Option A - Required Repairs

The interior finishes and features have been directly impacted by the failed exterior assemblies. As noted in previous studies and interior tenant improvement projects, the interior environment has been contaminated by mold spores. The extent of this contamination has not been determined at this time.

Ongoing exposure to water and moisture has impacted the performance of the thermal insulation, caused the gypsum wall board to deteriorate and vinyl wallcovering to delaminate. This general condition has been noted in many locations throughout the building.

To replace the curtainwall and ribbon window assemblies the interior wall assemblies will require significant demolition at the head and jamb conditions. The remaining portions of wall between these assemblies should be replaced at the same time.

At the punched window locations approximately 1/4 of the heads and jambs should be replaced due to general deterioration of the gypsum wall board and vinyl wall covering.

Vinyl wallcovering is contributing to the mold environment, this material should be removed from the inside face of all exterior walls. The walls should then be properly prepared for installation of a breathable paint system.

Option B – Recommended

The interior finishes and features have been directly impacted by the failed exterior assemblies. As noted in previous studies and interior tenant improvement projects, the interior environment has been contaminated by mold spores. The extent of this contamination has not been determined at this time.

Ongoing exposure to water and moisture has impacted the performance of the thermal insulation, caused the gypsum wall board to deteriorate and vinyl wallcovering to delaminate. This general condition has been noted in many locations throughout the building.

The existing aluminum window sills are a very good conductor of heat and cold from the window frames. By installing thermally broken frames for the punched windows and curtainwall assemblies the heat transfer through the frames to the sill should be significantly reduced. However, there should still be a thermal break between the frame and sill plate.

Replacement of the existing punched windows, curtainwall and ribbon window assemblies the interior wall assemblies will require significant demolition at the head and jamb conditions.

It is recommended that the following be implemented to provide a full remediation of the interior side of the exterior wall areas:

- Remove existing aluminum sill plate assemblies.
- Remove all existing vinyl wall covering and rubber base.
- Remove all existing gypsum wall board.
- Remove all existing fiberglass batt thermal insulation.
- Remove damage or corroded metal stud framing.
- Install new 'fire safing' at any openings at the perimeter slab edge, typically at curtainwall assemblies.
- Install new metal stud framing as required.
- Install new Fiberglass batt insulation, maintain 1" clear air space between insulation and existing concrete wall.
- Install new gypsum wall board.
- Paint wall with 'breathable' paint.
- Install new rubber base.
- Re-install aluminum sills.

Option C – Improvements

Proper installation of the exterior assemblies and replacement of interior wall insulation, gypsum wall board and finishes should improve the overall interior environment.

The Portland Building's iconic exterior design and historic building registration preclude any significant alteration to the building's appearance. There are some improvements that may be considered, with approval by the Portland Landmarks Commission.

- Clear or lighter tinted glazing.
- Replacing existing spandrel panel in the curtain wall and ribbon windows with vision glass.

# *Treatment Recommendations Matrix*

**THE PORTLAND BUILDING ASSESSMENT PHASE ONE**

Treatment Recommendations Matrix

| | Option A - Required | Option B -Recommended | Option C - Improvements |
|---|---|---|---|
| | Stabilization and repairs to arrest current water infiltration and/or correct current deficiencies. Does not address the root causes or represent a long-term solution | Holistic approach to address systemic deficiencies and failures that have led to chronic water infiltration and deterioration with the intent of addressing root causes and providing long-term results. | Upgrades that can be incorporated in addition to Option B with the intent of further improving the quality of the interior environment and/or building efficiency and maintenance. |
| **Glazing Systems** | | | |
| **Aluminum Windows @ Punched Openings in Tile and Concrete** | • Replace all sealant<br>• Replace all gaskets<br>• Seal gaps in aluminum frames<br>(Existing Window Assemblies to remain in place)<br><br>Note: These are short-term repairs, (typically 5 to 8 years) they should stop known instances of water infiltration, but will require constant maintenance to avoid failure and re-commencement of infiltration. | • Replace all windows with curtain wall system<br>Requirements:<br>- Match exterior dimensions, finish, glass, location<br>- Blast film or similar (no change to appearance)<br>- Thermal broken frame<br>- Improved integral details (non-visible changes)<br>- Insulated, tinted glazing for improved efficiency (High-efficiency Glazing/ PPG Solarban 70 XL)<br>• Replace all sealant<br>• **See details B4 and B5 @ Concrete Punched Openings**<br>• **See details B11 and B12 @ Tile locations** | • Operability for improved air quality (25% of windows)<br>• Modern glass technology may allow for improved daylighting, efficiency and transparency while maintaining exterior appearance (Solarban 70) |
| **Storefront @ First Floor** | • Replace all sealant<br>• Replace all gaskets<br>• Seal gaps in aluminum frames<br>• Replace incorrect colored frames and panels<br><br>Note: These are effective long-term solutions for storefronts recessed within the loggia. At storefronts on the surface of the building, these are short-term repairs and will require constant maintenance to avoid failure and re-commencement of infiltration. | • Replace storefronts<br>Requirements:<br>- Match exterior dimensions, finish, glass, location<br>- Blast film or similar (no change to appearance)<br>- Thermal broken frame<br>- Insulated, tinted glazing for improved efficiency (High-efficiency glazing/ PPG Solarban 70 XL)<br>- Improved integral details (non-visible changes)<br>• Replace all sealant<br>• Upgrade door hardware as required by code | • Modern glass technology may allow for improved daylighting, efficiency and transparency while maintaining exterior appearance<br>• Replace previous incompatible and/or inconsistent repairs/replacement storefronts |
| **Curtain Wall** | • Replace all curtain wall systems<br>Note: Severity of condition and systemic nature of deficiencies eliminate repair as an adequate option to arrest water infiltration. | • Replace all curtain wall systems<br>Requirements:<br>- Match exterior dimensions, finish, glass, location<br>- Blast film or similar (no change to appearance)<br>- Thermal break (internal change)<br>- Improved expansion, drainage, weep holes, flashing (non-visible changes)<br>- Non-sealant-dependent system<br>- Insulated, tinted glazing for improved efficiency (High-efficiency glazing/ PPG Solarban 70 XL)<br>- Back pan and insulate at spandrel sections for increased protection against water infiltration<br>• **See details B4 and B5 @ Concrete Punched Openings**<br>• **See details B8, B9 and B10 @ Tile** | • Operability for improved air quality<br>• Modern glass technology may allow for improved daylighting, efficiency and transparency while maintaining exterior appearance |

**THE PORTLAND BUILDING ASSESSMENT PHASE ONE**

Treatment Recommendations Matrix

| | Option A - Required | Option B -Recommended | Option C - Improvements |
|---|---|---|---|
| | Stabilization and repairs to arrest current water infiltration and/or correct current deficiencies. Does not address the root causes or represent a long-term solution | Holistic approach to address systemic deficiencies and failures that have led to chronic water infiltration and deterioration with the intent of addressing root causes and providing long-term results. | Upgrades that can be incorporated in addition to Option B with the intent of further improving the quality of the interior environment and/or building efficiency and maintenance. |
| **Ribbon Windows Assemblies in Red Tile Keystones** | • Replace all ribbon 'storefront' assemblies with curtain wall systems<br>Note: Severity of condition and systemic nature of deficiencies eliminate repair as an adequate option to arrest water infiltration. | • Replace all existing storefront assemblies with curtain wall systems<br>Requirements:<br>- Match exterior dimensions, finish, glass, location<br>- Blast film or similar (no change to appearance)<br>- Thermal break (internal change)<br>- Improved expansion, drainage, weep holes, flashing (non-visible changes)<br>- Non-sealant-dependent system<br>- Insulated, tinted glazing for improved efficiency (High-efficiency Glazing/ PPG Solarban 70 XL)<br>- Back pan and insulate at spandrel sections for increased protection against water infiltration<br>• **See details A2 and A3 and B6 and B7** | • Operability for improved air quality<br>• Modern glass technology may allow for improved daylighting, efficiency and transparency while maintaining exterior appearance |
| **Tile**<br>**Direct Adhered Ceramic Tile Veneer System** | • Re-grout joints with appropriate repair material<br>• Repair/replace severely cracked or loose tiles (10% of Tiles)<br>• Replace (2) red tile courses above ribbon windows and at top of keystone element. Treat corroded metal lath behind.<br>• Replace (1) red tile course below ribbon windows.<br>• Replace inappropriate replacement installations (field tiles used at corners exposing clay body to weather) – Part of 10% of Tile mentioned above.<br>• Replace sealant at control joints<br>• Clean<br>• Confirm that rod and flashing installations are intact/appropriate<br>• Budget to replace 10% of 'green" tile<br>• **See detail A1**<br><br>Note: These repairs address current damage, lessen water infiltration and improve aesthetics, but do not correct overall deficiencies in the tile installation and will likely not prevent future efflorescing. | • Replace all tile with improved assembly<br>Requirements:<br>- Match exterior dimensions, finish, shapes, etc.<br>- Replace inappropriate polypropylene layer with breathable felt layer<br>- Introduce drain plain<br>- Custom tiles with integral drip at window heads<br>- Improve flashing details<br>• At 'protected' tile location @ loggia – clean and patch/repair (10%) of 'green' tile<br>• **See details B1, B2 and B3**<br><br>Note: Changes to existing construction/detailing included as required by law or to correct deficiencies in original installation. | No recommended Improvements |
| **Concrete** | • Patch hairline cracks (5% of Concrete Area)<br>• Treat and patch imminent spalls (5% of Concrete Area)<br>• Repaint the 5% of Concrete Area to be treated<br>• Seal tie-back anchors<br>• Clean | • Patch hairline cracks (5% of Concrete Area)<br>• Treat and patch imminent spalls (5% of Concrete Area)<br>• Seal tie-back anchors<br>• Clean<br>• Reapply elastomeric coating | No Recommended Improvements |

**THE PORTLAND BUILDING ASSESSMENT PHASE ONE**

Treatment Recommendations Matrix

| | Option A - Required | Option B -Recommended | Option C - Improvements |
|---|---|---|---|
| | Stabilization and repairs to arrest current water infiltration and/or correct current deficiencies. Does not address the root causes or represent a long-term solution | Holistic approach to address systemic deficiencies and failures that have led to chronic water infiltration and deterioration with the intent of addressing root causes and providing long-term results. | Upgrades that can be incorporated in addition to Option B with the intent of further improving the quality of the interior environment and/or building efficiency and maintenance. |
| **Stucco @ Capitals and Ornamental Medallions/Ribbons** | • Patch hairline cracks<br>• Replace sealant at ornament<br>• Reroof capitals (approximately 200 sf, each) with Modified Bitumen Roof<br>• Remove and reinstall accent ribbon band sections at North and South as required to replace curtain wall systems | • Patch hairline cracks<br>• Replace sealant at ornament<br>• Evaluate and treat exposed fasteners and framing at back of ornament<br>• Clean and paint<br>• Reroof capitals (approximately 200 sf, each) with Modified Bitumen Roof<br>• Remove and reinstall accent ribbon band sections at North and South as required to replace curtain wall systems | No Recommended Improvements |
| **Interior Finishes** | • At Curtain Wall systems (only):<br>- Remove and replace gypsum wall board and insulation from floor to ceiling around the openings<br>- Remove and replace ACT Ceiling from exterior wall back to 4’-0” off exterior walls | • Throughout the Building:<br>- Remove and replace gypsum wall board and insulation from floor to ceiling at all exterior walls<br>- Remove and replace ACT Ceiling from exterior wall back to 4’-0” off exterior walls | No Recommended Improvements |
| **Louvers** | • Clean | • Remove, clean, repaint and reinstall | No Recommended Improvements |
| **Exterior Handrails and Guardrails** | • Clean and repaint to match existing | • Clean and repaint to match existing | No Recommended Improvements |
| **Roof and Penthouse Elements** | • Repaired under separate contract | • Repaired under separate contract | -- |

# *Structural Recommendations*

## *Structural Recommendations*

The structural assessment has identified significant seismic load resisting system deficiencies throughout the existing building structure. Based on these deficiencies, the building can be expected to perform poorly in most seismic events. As a result of these identified deficiencies, the City has requested a conceptual level repairs report that presents a rehabilitation scheme to mitigate the deficiencies such that the upgraded building would conform to current code requirements. This concept scheme could then be used, by a cost estimator or general contractor, to obtain a preliminary estimate of probable cost of rehabilitation.

Based on discussion with the City, and coordination with the design team, the best full-building upgrade scheme involves adding new concrete moment frames at the perimeter of the building. Compared to other options that were discussed with the City and the design team, the moment frame option was identified as providing the most benefits and the least amount of drawbacks. The moment frame system allows for relatively minimal impact on the majority of the building interior (i.e. minimal impact on elevator core and associated utilities, minimal interior space planning impacts). Another significant benefit is the consolidation of the structural work to be mostly contained within the same locations as the exterior envelope work. At most levels, the work may be limited to only the outer ten feet of the floor plate. This will allow for the opportunity to have continued operation of the building with relatively minimal disruption compared to the other options considered.

This seismic strengthening conceptual layout with plans, elevations, and detail sketches are included in Appendix D of this report. These new concrete moment frames include the addition of new concrete columns and beams along Grids B, G, 2, and 7. New concrete would be added to the existing beams along those lines. New concrete columns would be added at twenty locations along the previously mentioned gridlines above the fourth floor slab. Below the fourth floor slab, the existing concrete columns would be wrapped in new concrete to strength them such that they could become part of the new moment frame system. The new beams would also serve as a backup gravity system in the event that the existing exterior shear walls experience significant degradation. Where new concrete beams are not added, steel tube columns are to be added for gravity backup where existing concrete walls currently support the floor slab. Concrete will also be added to the existing mat footing to strengthen it to resist the applied loads from the moment frames above.

Being designed per current code requirements, the new concrete moment frame system will provide significant seismic performance benefits to the existing structure. Whereas the existing structure may experience at least some damage in most earthquakes, a building upgraded to current code can be expected to greatly minimize that damage. Minor and most moderate level earthquakes would likely not produce any

structural damage on a “current code” building. Major level earthquakes would create some damage, but most “current code” buildings would be repairable and still within useable levels.

# *Construction Cost Estimate*

## *Construction Cost Estimate*

**Direct Construction Cost**

The following estimates are for direct construction cost only. The do not include furnishings and equipment (FF and E), architect and engineer design fees, consultant fees, inspection and testing fees, plan check fees, mold and hazardous material testing and removal, financing costs, temporary relocation of staff and materials, temporary space rental of improvements, not any other normally associated development costs, (aka owners "soft costs")

These estimates assume a construction start date of 'Spring, 2014'. If the start of construction is delayed beyond the date above, the estimates must be indexed at a rate of 3 to 45 per year, compounded.

No work has been included in the estimate for the restoration of the Portlandia statue.

Phasing cost allowance is for sequencing the work, i.e. phase 1, east elevation, phase 2, north elevation, etc.

The Direct Construction Cost Summary has been developed based on two scenarios for repair and restoration of the exterior envelop and the recommended approach for the Structural Upgrade.

- Option A – Required

  Stabilization and repairs to arrest current water infiltration and/or correct current deficiencies. Does not address the root causes or represent a long-term solution.

- Option B – Recommended

  Holistic approach to address systemic deficiencies and failures that have led to chronic water infiltration and deterioration with the intent of addressing root causes and providing long-term results.

- Structural Upgrade

  Added reinforced concrete moment frame to the perimeter of the building.

| | | |
|---|---|---|
| **Exterior Assessment + Rehabilitation S** | *Architectural Cost Consultants, LLC* | Estimate Date: 18-Mar-13 |
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: 18-Mar-13 |
| FFA Architecture + Interiors | Tigard, Oregon 97223-8489 | Print Time: 9:45 AM |
| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: Spring 2014 |

# DIRECT CONSTRUCTION COST SUMMARY

| Component | Area | | $ / SF | Total |
|---|---|---|---|---|
| Option A | 100,085 | sf | $99.08 /sf | $9,916,393 |
| Option B | 100,085 | sf | $126.98 /sf | $12,709,059 |
| Structural Upgrade | 560,000 | sf | $30.04 /sf | $16,820,264 |

***ALTERNATES***

| | | |
|---|---|---|
| 01 \| Aluminum Windows, Operable Units + Upgrade Glass (add to Opt B) | Add ± | 222,691 |
| 02 \| Storefront @ 1st Floor - Upgrade Glass (add to Opt B) | Add ± | 70,752 |
| 03 \| Curtain Wall - Operable Units + Glass Upgrade (add to Opt A & B) | Add ± | 234,202 |
| 04 \| Ribbon Window - Operable Units + Glass Upgrade (add to Opt A & B) | Add ± | 26,781 |
| 05 \| Alternate Five | | 0 |
| 06 \| Alternate Six | | 0 |

The above estimates are for direct construction cost only. They do not include furnishings & equipment, architect and engineer design fees, consultant fees, inspection and testing fees, plan check fees, state sales tax, mold and hazardous material testing and removal, financing costs, nor any other normally associated development costs. (aka owners "soft costs")

The above estimates assume a competitively bid project, with at least three qualified bidders in each of the major sub-trades.

The above estimates assume a construction start date of: **Spring 2014** If the start of construction is delayed beyond the date above, the estimates must be indexed at a rate of 3 to 4% per year compounded.

This is a probable cost estimate based on in-progress documentation provided by the architect. The actual bid documents will vary from this estimate due to document completion, detailing, specification, addendum, etc.. The estimator has no control over the cost or availability of labor, equipment, materials, over market conditions or contractor's method of pricing, contractor's construction logistics and scheduling. This estimate is formulated on the estimators professional judgment and experience. The estimate makes no warranty, expressed or implied, that the quantities, bids or the negotiated cost of the work will not vary from the estimators opinion of probable construction cost.

No work included in the estimate for restoration of Portlandia, work done under separate contract.

Phasing cost allowance is for sequencing the work, i.e. phase 1, east elevation, phase 2, north elevation, etc. CMGC to confirm construction logistics.

| **Exterior Assessment + Rehabilitation Study** | *Architectural Cost Consultants, LLC* | Estimate Date: 18-Mar-13 |
|---|---|---|
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: 18-Mar-13 |
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| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: Spring 2014 |

| **SUMMARY** | **Option A** | **Option B** | **Structural Upgrade** | |
|---|---|---|---|---|

| **DIRECT CONSTRUCTION COSTS** | **%** | **$ / sf** | **Cost** | **$ / sf** | **Cost** | **$ / sf** | **Cost** | **Comments** |
|---|---|---|---|---|---|---|---|---|
| Area | | 100,085 sf | | 100,085 sf | | 560,000 sf | | |
| 01 \| General Requirements | | $16.35 | $1,636,553 | $16.35 | $1,636,553 | $2.27 | $1,270,553 | |
| 02 \| Aluminum Windows @ Punched Openings | | 3.36 | 336,647 | 8.47 | 848,136 | 0.00 | 0 | |
| 03 \| Storefront @ First Floor | | 1.57 | 157,240 | 3.77 | 376,982 | 0.00 | 0 | |
| 04 \| Curtain Wall | | 21.15 | 2,117,246 | 21.15 | 2,117,246 | 0.00 | 0 | |
| 05 \| Ribbon Window Assembly @ Red Tile Keystones | | 2.31 | 230,749 | 2.31 | 230,749 | 0.00 | 0 | |
| 06 \| Tile - Direct Adhered | | 10.13 | 1,013,513 | 14.86 | 1,486,968 | 0.00 | 0 | |
| 07 \| Concrete | | 2.52 | 252,184 | 3.44 | 343,887 | 0.00 | 0 | |
| 08 \| Stucco @ Capitals & Ornamental Medallions | | 0.64 | 64,038 | 0.82 | 82,395 | 0.00 | 0 | |
| 09 \| Interior Finishes | | 3.95 | 394,885 | 8.05 | 805,817 | 0.00 | 0 | |
| 10 \| Louvers | | 0.03 | 2,800 | 0.27 | 26,875 | 0.00 | 0 | |
| 11 \| Exterior Handrails & Guardrails | | 0.07 | 7,290 | 0.07 | 7,290 | 0.00 | 0 | |
| 12 \| Roof & Penthouse Elements | | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | NIC - separate contract |
| 13 \| Concrete Work | | 0.00 | 0 | 0.00 | 0 | 13.81 | 7,735,124 | |
| 14 \| Structural Steel | | 0.00 | 0 | 0.00 | 0 | 0.19 | 108,549 | |
| 15 \| Additional Interior Finishes | | 0.00 | 0 | 0.00 | 0 | 3.36 | 1,882,767 | |
| **SUB-TOTAL** | | **$62.08** | **$6,213,145** | **$79.56** | **$7,962,898** | **$19.64** | **$10,996,993** | |
| Estimating Contingency | 20.00% | 12.42 | 1,242,629 | 15.91 | 1,592,580 | 2.95 | 1,649,549 | |
| Phasing | 5.00% | 3.72 | 372,789 | 4.77 | 477,774 | 1.13 | 632,327 | |
| Index To Construction Start | 3.00% | 2.35 | 234,857 | 3.01 | 300,998 | 0.71 | 398,366 | |
| CM/GC Contingency | 7.50% | 6.04 | 604,756 | 7.74 | 775,069 | 1.83 | 1,025,793 | |
| General Conditions / Insurance / Bond | 10.00% | 8.66 | 866,818 | 11.10 | 1,110,932 | 2.63 | 1,470,303 | |
| General Contractor OH & Profit | 4.00% | 3.81 | 381,400 | 4.88 | 488,810 | 1.16 | 646,933 | |
| **TOTAL DIRECT CONSTRUCTION COST** | | **$99.08** | **$9,916,393** | **$126.98** | **$12,709,059** | **$30.04** | **$16,820,264** | |

Option A

| **Exterior Assessment + Rehabilitation S** | *Architectural Cost Consultants, LLC* | Estimate Date: 18-Mar-13 |
|---|---|---|
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: 18-Mar-13 |
| FFA Architecture + Interiors | Tigard, Oregon 97223-8489 | Print Time: 9:45 AM |
| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: Spring 2014 |

| **Option A** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| **01 \| General Requirements** | | | | | | |
| Hoisting / Scaffolding / Temp Work | | | | | | |
| scaffold / weather enclosure | 100,085 | sf | $4.00 | $400,340 | | one elevation per time |
| temp interior barriers | 100,085 | sf | 2.50 | 250,213 | | |
| temp sidewalk fall protection | 8,600 | sf | 10.00 | 86,000 | | |
| crane / hoisting | 12 | mo | 70,000.00 | 840,000 | | allowance |
| barricades / flagging | 1 | sum | 60,000.00 | 60,000 | | allowance |
| Sub-total | 100,085 | sf | 16.35 | /sf | $1,636,553 | |
| SUB-TOTAL 01 \| General Requirements | | | | | **$1,636,553** | |
| **02 \| Aluminum Windows @ Punched Openings** | | | | | | |
| remove / replace all sealants | 7,226 | lf | 17.50 | 126,455 | | |
| remove / replace all gaskets | 8,503 | sf | 21.25 | 180,650 | | |
| seal gaps in alumn. frames | 7,226 | lf | 3.50 | 25,291 | | |
| clean glass | 17,006 | sf | 0.25 | 4,251 | | |
| Sub-total | 100,085 | sf | 3.36 | /sf | 336,647 | |
| SUB-TOTAL 02 \| Aluminum Windows @ Punched Openings | | | | | **$336,647** | |
| **03 \| Storefront @ First Floor** | | | | | | |
| remove / replace all sealants | 1,863 | lf | 17.50 | 32,603 | | |
| remove / replace all gaskets | 4,433 | sf | 21.25 | 94,184 | | |
| replace incorrect colored frames & panels | 434 | sf | 65.00 | 28,236 | | assume 15 % |
| clean glass | 8,866 | sf | 0.25 | 2,217 | | |
| Sub-total | 100,085 | sf | 1.57 | /sf | 157,240 | |
| SUB-TOTAL 03 \| Storefront @ First Floor | | | | | **$157,240** | |
| **04 \| Curtain Wall** | | | | | | |
| remove curtain wall | 19,591 | sf | 6.00 | 117,546 | | |
| haul & disposal | 1 | sum | 17,631.90 | 17,632 | | |
| remove / reinstall accent bands | 6 | ea | 0.00 | 0 | | with work item 8 below |
| spandrel insulation | 15,367 | sf | 0.80 | 12,294 | | |
| new glav. prefinished sm head flashing | 64 | lf | 10.00 | 640 | | |
| new silicone sheet | 64 | lf | 5.00 | 320 | | |
| curtain wall, thermal break | | | | | | |
| narrow | 7,228 | sf | 115.00 | 831,220 | | |
| typical | 12,363 | sf | 75.00 | 927,233 | | |
| blast film | 19,591 | sf | 10.00 | 195,911 | | verify spec. |
| white accent band | 236 | lf | 36.00 | 8,496 | | |
| clean glass | 23,815 | sf | 0.25 | 5,954 | | |
| Sub-total | 100,085 | sf | 21.15 | /sf | 2,117,246 | |
| SUB-TOTAL 04 \| Curtain Wall | | | | | **$2,117,246** | |

| **Exterior Assessment + Rehabilitation S** | *Architectural Cost Consultants, LLC* | Estimate Date: | 18-Mar-13 |
|---|---|---|---|
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: | 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: | 18-Mar-13 |
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| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: | Spring 2014 |

| **Option A** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| **05 \| Ribbon Window Assembly @ Red Tile Keystones** | | | | | | **see item 06 for related work** |
| remove ribbon windows | 2,488 | sf | 6.00 | 14,928 | | |
| haul & disposal | 1 | sum | 2,239.20 | 2,239 | | |
| remove / reinstall accent bands | 6 | ea | 0.00 | 0 | | with work item 8 below |
| spandrel insulation | 1,560 | sf | 0.80 | 1,248 | | |
| curtain wall, thermal break | 2,488 | sf | 75.00 | 186,600 | | |
| blast film | 2,488 | sf | 10.00 | 24,880 | | verify spec. |
| clean glass | 3,416 | sf | 0.25 | 854 | | |
| Sub-total | 100,085 | sf | 2.31 | /sf | 230,749 | |
| SUB-TOTAL 05 \| Ribbon Window Assembly @ Red Tile Keystones | | | | | **$230,749** | |
| **06 \| Tile - Direct Adhered** | | | | | | |
| Tile red | 6,290 | sf | | | | |
| green | 30,433 | sf | | | | |
| loggia | 523 | sf | | | | |
| re-grout joints. dtl. A1 | 36,723 | sf | 16.00 | 587,568 | | |
| repair / replace tiles 10.00% | 3,725 | sf | 28.00 | 104,289 | | |
| off-hours premium | 15.00% | of | 691,857.00 | 103,779 | | |
| dtl. A2 - head | 634 | lf | | | | @ ribbon windows |
| remove (2) tiles abv. ribbon window | 634 | lf | 15.00 | 9,510 | | |
| clean & prep substrate | 951 | sf | 2.50 | 2,378 | | |
| new self adhered membrane | 634 | lf | 5.00 | 3,170 | | |
| new fluid applied barrier | 634 | lf | 7.00 | 4,438 | | |
| new drainage mat | 634 | lf | 3.50 | 2,219 | | |
| new galv. prefinished sm flashing | 634 | lf | 10.00 | 6,340 | | |
| new silicone sheet | 634 | lf | 5.00 | 3,170 | | |
| new tile + setting bed | 951 | sf | 30.00 | 28,530 | | |
| dtl. A3 - sill | 608 | lf | | | | @ ribbon windows |
| remove (1) tiles abv. ribbon window | 608 | lf | 12.00 | 7,296 | | |
| clean & prep substrate | 608 | lf | 2.50 | 1,520 | | |
| new fluid applied barrier | 608 | lf | 7.00 | 4,256 | | |
| new drainage mat | 608 | lf | 3.50 | 2,128 | | |
| new galv. prefinished sm flashing | 608 | lf | 10.00 | 6,080 | | |
| new silicone sheet | 608 | lf | 5.00 | 3,040 | | |
| new tile + setting bed | 608 | lf | 30.00 | 18,240 | | |
| replace sealant @ control joints | 36,723 | sf | 2.25 | 82,627 | | |
| clean tile | 37,246 | sf | 0.75 | 27,935 | | |
| electrical, remove / reinstall fixtures | 1 | sum | 5,000.00 | 5,000 | | allowance |
| Sub-total | 100,085 | sf | 10.13 | /sf | 1,013,513 | |
| SUB-TOTAL 06 \| Tile - Direct Adhered | | | | | **$1,013,513** | |
| **07 \| Concrete** | | | | | | |
| Concrete | 65,502 | sf | | | | |
| patch hairline cracks 5.00% | 3,275 | sf | 15.00 | 49,127 | | allowance |
| treat & patch imminent spal 5.00% | 3,275 | sf | 20.00 | 65,502 | | allowance |
| repaint 5.00% | 3,275 | sf | 2.00 | 6,550 | | |
| seal tie-back anchors | 65,502 | sf | 1.25 | 81,878 | | allowance |
| clean | 65,502 | sf | 0.75 | 49,127 | | |
| Sub-total | 100,085 | sf | 2.52 | /sf | 252,184 | |
| SUB-TOTAL 07 \| Concrete | | | | | **$252,184** | |

| **Exterior Assessment + Rehabilitation S** | *Architectural Cost Consultants, LLC* | Estimate Date: | 18-Mar-13 |
|---|---|---|---|
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: | 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: | 18-Mar-13 |
| FFA Architecture + Interiors | Tigard, Oregon 97223-8489 | Print Time: | 9:45 AM |
| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: | Spring 2014 |

| **Option A** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| **08 \| Stucco @ Capitals & Ornamental Medallions** | | | | | | |
| Stucco | 5,492 | sf | | | | |
| patch hairline cracks 10.00% | 549 | sf | 15.00 | 8,238 | | allowance |
| replace sealant @ ornament | 8 | ea | 1,500.00 | 12,000 | | |
| remove roofing | 800 | sf | 2.50 | 2,000 | | |
| haul & disposal | 1 | sum | 400.00 | 400 | | |
| R-30 roof insulation, includes crickets | 800 | sf | 8.00 | 6,400 | | |
| modified bitumen roofing | 800 | sf | 15.00 | 12,000 | | |
| flashings | 800 | sf | 10.00 | 8,000 | | |
| remove / reinstall accent bands | 6 | ea | 2,500.00 | 15,000 | | |
| Sub-total | 100,085 | sf | 0.64 | /sf | 64,038 | |
| SUB-TOTAL 08 \| Stucco @ Capitals & Ornamental Medallions | | | | | **$64,038** | |
| **09 \| Interior Finishes** | | | | | | |
| remove gypboard | 36,754 | sf | 1.00 | 36,754 | | |
| remove insulation | 36,754 | sf | 0.35 | 12,864 | | |
| remove ACT ceiling, back 4'0" frm ext. wall | 14,576 | sf | 0.85 | 12,390 | | |
| remove flooring | | sf | 0.00 | 0 | | NIC to remain |
| remove metal sill, salvage, conc. opng | 1,798 | lf | 0.00 | 0 | | NIC to remain |
| remove metal sill, salvage, curtain wall | 1,048 | lf | 2.75 | 2,882 | | |
| remove metal sill, salvage, ribbon window | 232 | lf | 2.75 | 638 | | |
| haul & disposal | 1 | sum | 13,105.60 | 13,106 | | |
| new batt insulation | 36,754 | sf | 0.85 | 31,241 | | |
| new vapor barrier | 36,754 | sf | 0.25 | 9,189 | | |
| new gypboard, vertical wall | 36,754 | sf | 2.55 | 93,723 | | |
| new gypboard, head | 1,280 | lf | 5.00 | 6,400 | | |
| new gypboard, jamb | 3,824 | lf | 5.00 | 19,120 | | |
| install new ceiling | 14,576 | sf | 4.00 | 58,304 | | |
| reinstall metal sill | 1,280 | lf | 3.50 | 4,480 | | |
| base, rubber | 3,644 | lf | 2.00 | 7,288 | | |
| paint gypboard | 32,796 | sf | 0.65 | 21,317 | | |
| misc. patch / touchup | 36,754 | sf | 0.25 | 9,189 | | allowance |
| mech / electrical, remove / reinstall devices | 14 | levels | 4,000.00 | 56,000 | | allowance |
| Sub-total | 100,085 | sf | 3.95 | /sf | 394,885 | |
| SUB-TOTAL 09 \| Interior Finishes | | | | | **$394,885** | |
| **10 \| Louvers** | | | | | | |
| clean, in place | 800 | sf | 3.50 | 2,800 | | |
| Sub-total | 100,085 | sf | 0.03 | /sf | 2,800 | |
| SUB-TOTAL 10 \| Louvers | | | | | **$2,800** | |
| **11 \| Exterior Handrails & Guardrails** | | | | | | |
| clean, prep, repaint guardrails | 250 | lf | 25.00 | 6,250 | | |
| clean, prep, repaint handrails | 104 | lf | 10.00 | 1,040 | | |
| Sub-total | 100,085 | sf | 0.07 | /sf | 7,290 | |
| SUB-TOTAL 11 \| Exterior Handrails & Guardrails | | | | | **$7,290** | |

| | | |
|---|---|---|
| **Exterior Assessment + Rehabilitation S** | *Architectural Cost Consultants, LLC* | Estimate Date: 18-Mar-13 |
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| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: 18-Mar-13 |
| FFA Architecture + Interiors | Tigard, Oregon 97223-8489 | Print Time: 9:45 AM |
| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: Spring 2014 |

| **Option A** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| **12 \| Roof & Penthouse Elements** | | | | | | |
| Roofing | | | | | | |
| item | | sf | 0.00 | 0 | | NIC - separate contract |
| Sub-total | 100,085 | sf | 0.00 /sf | | 0 | |
| Penthouse Elements | | | | | | |
| item | | sf | 0.00 | 0 | | NIC - separate contract |
| Sub-total | 100,085 | sf | 0.00 /sf | | 0 | |
| SUB-TOTAL 12 \| Roof & Penthouse Elements | | | | | **$0** | |
| **SUB-TOTAL** | | | 62.08 | 6,213,145 | **$6,213,145** | |
| Estimating Contingency | | | 20.00% | 1,242,629 | | |
| Phasing | | | 5.00% | 372,789 | | |
| Index To Construction Start | Spring 2014 | | 3.00% | 234,857 | | @ ± 3% per year |
| CM/GC Contingency | | | 7.50% | 604,756 | | |
| General Conditions / Insurance / Bond | | | 10.00% | 866,818 | | |
| General Contractor OH & Profit | | | 4.00% | 381,400 | 3,703,248 | 59.60% |
| **TOTAL DIRECT CONSTRUCTION COST Option A** | **100,085** | **sf** | **$99.08** | **/sf** | **$9,916,393** | |
| North Elevation | 26,275 | sf | | | | |
| South Elevation | 26,275 | sf | | | | |
| East Elevation | 24,450 | sf | | | | |
| West Elevation | 23,085 | sf | | | | |

Option B

| **Exterior Assessment + Rehabilitation S** | *Architectural Cost Consultants, LLC* | Estimate Date: 18-Mar-13 |
|---|---|---|
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: 18-Mar-13 |
| FFA Architecture + Interiors | Tigard, Oregon 97223-8489 | Print Time: 9:45 AM |
| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: Spring 2014 |

| **Option B** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| **01 \| General Requirements** | | | | | | |
| Hoisting / Scaffolding / Temp Work | | | | | | |
| scaffold / weather enclosure | 100,085 | sf | $4.00 | $400,340 | | one elevation per time |
| temp interior barriers | 100,085 | sf | 2.50 | 250,213 | | |
| temp sidewalk fall protection | 8,600 | sf | 10.00 | 86,000 | | |
| crane / hoisting | 12 | mo | 70,000.00 | 840,000 | | allowance |
| barricades / flagging | 1 | sum | 60,000.00 | 60,000 | | allowance |
| Sub-total | 100,085 | sf | 16.35 | /sf | $1,636,553 | |
| SUB-TOTAL 01 \| General Requirements | | | | | **$1,636,553** | |
| **02 \| Aluminum Windows @ Punched Openings** | | | | | | |
| remove alumn. windows | 8,503 | sf | 5.00 | 42,514 | | |
| haul & disposal | 1 | sum | 6,377.10 | 6,377 | | |
| new curtain wall window, thermal break | 8,503 | sf | 75.00 | 637,706 | | |
| blast film | 8,503 | sf | 10.00 | 85,028 | | verify spec. |
| dual sealant joints | 7,226 | lf | 10.00 | 72,260 | | |
| clean glass | 17,006 | sf | 0.25 | 4,251 | | |
| Sub-total | 100,085 | sf | 8.47 | /sf | 848,136 | |
| SUB-TOTAL 02 \| Aluminum Windows @ Punched Openings | | | | | **$848,136** | |
| **03 \| Storefront @ First Floor** | | | | | | |
| remove storefront | 4,433 | sf | 5.00 | 22,165 | | |
| haul & disposal | 1 | sum | 3,324.75 | 3,325 | | |
| new alumn. storefront, thermal break | 4,433 | sf | 55.00 | 243,815 | | |
| blast film | 4,433 | sf | 10.00 | 44,330 | | verify spec. |
| dual sealant joints | 1,863 | lf | 10.00 | 18,630 | | |
| clean glass | 8,866 | sf | 0.25 | 2,217 | | |
| upgrade door hardware | 17 | sets | 2,500.00 | 42,500 | | allowance |
| Sub-total | 100,085 | sf | 3.77 | /sf | 376,982 | |
| SUB-TOTAL 03 \| Storefront @ First Floor | | | | | **$376,982** | |
| **04 \| Curtain Wall** | | | | | | |
| remove curtain wall | 19,591 | sf | 6.00 | 117,546 | | |
| haul & disposal | 1 | sum | 17,631.90 | 17,632 | | |
| remove / reinstall accent bands | 6 | ea | 0.00 | 0 | | with work item 8 below |
| spandrel insulation | 15,367 | sf | 0.80 | 12,294 | | |
| new glav. prefinished sm head flashing | 64 | lf | 10.00 | 640 | | |
| new silicone sheet | 64 | lf | 5.00 | 320 | | |
| curtain wall, thermal break | | | | | | |
| narrow | 7,228 | sf | 115.00 | 831,220 | | |
| typical | 12,363 | sf | 75.00 | 927,233 | | |
| blast film | 19,591 | sf | 10.00 | 195,911 | | verify spec. |
| white accent band | 236 | lf | 36.00 | 8,496 | | |
| clean glass | 23,815 | sf | 0.25 | 5,954 | | |
| Sub-total | 100,085 | sf | 21.15 | /sf | 2,117,246 | |
| SUB-TOTAL 04 \| Curtain Wall | | | | | **$2,117,246** | |

| **Option B** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| **05 \| Ribbon Window Assembly @ Red Tile Keystones** | | | | | | **see item 06 for related work** |
| remove ribbon windows | 2,488 | sf | 6.00 | 14,928 | | |
| haul & disposal | 1 | sum | 2,239.20 | 2,239 | | |
| remove / reinstall accent bands | 6 | ea | 0.00 | 0 | | with work item 8 below |
| spandrel insulation | 1,560 | sf | 0.80 | 1,248 | | |
| curtain wall, thermal break | 2,488 | sf | 75.00 | 186,600 | | |
| blast film | 2,488 | sf | 10.00 | 24,880 | | verify spec. |
| clean glass | 3,416 | sf | 0.25 | 854 | | |
| Sub-total | 100,085 | sf | 2.31 | /sf | 230,749 | |
| SUB-TOTAL 05 \| Ribbon Window Assembly @ Red Tile Keystones | | | | | **$230,749** | |
| **06 \| Tile - Direct Adhered** | | | | | | |
| Tile red | 6,290 | sf | | | | |
| green | 30,433 | sf | | | | |
| loggia | 523 | sf | | | | |
| remove tile | 36,723 | sf | 5.00 | 183,615 | | loggia NIC |
| off hours premium | 0 | of | 183,615.00 | 55,085 | | |
| haul & disposal | 1 | sum | 27,542.25 | 27,542 | | |
| new fluid applied air membrane | 36,723 | sf | 4.00 | 146,892 | | |
| new tile, red, drainage mat, setting bed | 6,290 | sf | 25.00 | 157,250 | | |
| new tile, green | 30,433 | sf | 25.00 | 760,825 | | |
| dtl. B1 | | | | | | |
| self adhered membrane | 1,094 | lf | 5.00 | 5,470 | | |
| new 2-piece ss sm counter flashing | 1,094 | lf | 18.00 | 19,692 | | |
| dtl. B3 | | | | | | |
| sawcut reglet | 372 | lf | 20.00 | 7,440 | | |
| self adhered membrane | 372 | lf | 4.00 | 1,488 | | |
| sm flashing / coping | 372 | lf | 8.50 | 3,162 | | |
| dtl. B6 - head | 634 | lf | | | | @ ribbon windows |
| new self adhered membrane | 634 | lf | 5.00 | 3,170 | | |
| new fluid applied barrier | 634 | lf | 7.00 | 4,438 | | |
| new drainage mat | 634 | lf | 3.50 | 2,219 | | |
| new galv. prefinished sm flashing | 634 | lf | 10.00 | 6,340 | | |
| new silicone sheet | 634 | lf | 5.00 | 3,170 | | |
| dtl. B7 - sill | 608 | lf | | | | @ ribbon windows |
| new fluid applied barrier | 608 | lf | 7.00 | 4,256 | | |
| new drainage mat | 608 | lf | 3.50 | 2,128 | | |
| new galv. prefinished sm flashing | 608 | lf | 10.00 | 6,080 | | |
| new silicone sheet | 608 | lf | 5.00 | 3,040 | | |
| dtl. B8 - sill | | | | | | |
| self adhered membrane | 240 | lf | 5.00 | 1,200 | | |
| new sm flashing | 240 | lf | 8.50 | 2,040 | | |
| new drainage mat | 240 | lf | 3.50 | 840 | | |
| dtl. B9 - head | | | | | | |
| silicone sheet | 264 | lf | 5.00 | 1,320 | | |
| new sm flashing | 264 | lf | 8.50 | 2,244 | | |
| dtl. B11 - head | | | | | | |
| self adhered membrane | 571 | lf | 5.00 | 2,855 | | |
| ss flashing w/ hemmed edge | 571 | lf | 8.50 | 4,854 | | |
| silicone sheet | 571 | lf | 5.00 | 2,855 | | |
| dtl. B12 - sill | | | | | | |
| silicone sheet | 571 | lf | 5.00 | 2,855 | | |

| **Option B** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| 06 \| Tile - Direct Adhered - Continued | | | | | | |
| Tile - continued | | | | | | |
| coping / flashing | 1,254 | lf | 20.00 | 25,080 | | |
| misc. flashing / sealants | 36,723 | sf | 0.85 | 31,215 | | |
| clean tile loggia | 523 | sf | 2.50 | 1,308 | | |
| electrical, remove / reinstall fixtures | 1 | sum | 5,000.00 | 5,000 | | allowance |
| Sub-total | 100,085 | sf | 14.86 | /sf | 1,486,968 | |
| SUB-TOTAL 06 \| Tile - Direct Adhered | | | | | **$1,486,968** | |
| **07 \| Concrete** | | | | | | |
| Concrete | 65,502 | sf | | | | |
| patch hairline cracks 5.00% | 3,275 | sf | 15.00 | 49,127 | | allowance |
| treat & patch imminent spal 5.00% | 3,275 | sf | 20.00 | 65,502 | | allowance |
| repaint 100.00% | 65,502 | sf | 1.50 | 98,253 | | |
| seal tie-back anchors | 65,502 | sf | 1.25 | 81,878 | | allowance |
| clean | 65,502 | sf | 0.75 | 49,127 | | |
| Sub-total | 100,085 | sf | 3.44 | /sf | 343,887 | |
| SUB-TOTAL 07 \| Concrete | | | | | **$343,887** | |
| **08 \| Stucco @ Capitals & Ornamental Medallions** | | | | | | |
| Stucco | 5,492 | sf | | | | |
| patch hairline cracks 10.00% | 549 | sf | 15.00 | 8,238 | | allowance |
| replace sealant @ ornament | 8 | ea | 1,500.00 | 12,000 | | |
| evaluate & treat exp. fasteners & framing | 1 | sum | 6,000.00 | 6,000 | | allowance |
| remove roofing | 800 | sf | 2.50 | 2,000 | | |
| haul & disposal | 1 | sum | 400.00 | 400 | | |
| clean | 5,492 | sf | 0.75 | 4,119 | | |
| repaint | 5,492 | sf | 1.50 | 8,238 | | |
| R-30 roof insulation, includes crickets | 800 | sf | 8.00 | 6,400 | | |
| modified bitumen roofing | 800 | sf | 15.00 | 12,000 | | |
| flashings | 800 | sf | 10.00 | 8,000 | | |
| remove / reinstall accent bands | 6 | ea | 2,500.00 | 15,000 | | |
| Sub-total | 100,085 | sf | 0.82 | /sf | 82,395 | |
| SUB-TOTAL 08 \| Stucco @ Capitals & Ornamental Medallions | | | | | **$82,395** | |

| **Option B** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| **09 \| Interior Finishes** | | | | | | |
| remove gypboard | 77,379 | sf | 1.00 | 77,379 | | |
| remove insulation | 77,379 | sf | 0.35 | 27,083 | | |
| remove ACT ceiling, back 4'0" frm ext. wall | 31,664 | sf | 0.85 | 26,914 | | |
| remove flooring | | sf | 0.00 | 0 | | NIC to remain |
| remove metal sill, salvage, conc. opng | 1,798 | lf | 2.75 | 4,943 | | NIC to remain |
| remove metal sill, salvage, curtain wall | 1,048 | lf | 2.75 | 2,882 | | |
| remove metal sill, salvage, ribbon window | 232 | lf | 2.75 | 638 | | |
| haul & disposal | 1 | sum | 27,967.80 | 27,968 | | |
| new batt insulation | 77,379 | sf | 0.85 | 65,772 | | |
| new vapor barrier | 77,379 | sf | 0.25 | 19,345 | | |
| new gypboard, vertical wall | 77,379 | sf | 2.55 | 197,317 | | |
| new gypboard, head | 3,078 | lf | 5.00 | 15,388 | | |
| new gypboard, jamb | 7,455 | lf | 5.00 | 37,275 | | |
| install new ceiling | 31,664 | sf | 4.00 | 126,656 | | |
| reinstall metal sill | 3,078 | lf | 3.50 | 10,771 | | |
| base, rubber | 7,916 | lf | 2.00 | 15,832 | | |
| paint gypboard | 71,244 | sf | 0.65 | 46,309 | | |
| misc. patch / touchup | 77,379 | sf | 0.25 | 19,345 | | allowance |
| mech / electrical, remove / reinstall devices | 14 | levels | 6,000.00 | 84,000 | | allowance |
| Sub-total | 100,085 | sf | 8.05 | /sf | 805,817 | |
| SUB-TOTAL 09 \| Interior Finishes | | | | | **$805,817** | |
| **10 \| Louvers** | | | | | | |
| remove, salvage | 800 | sf | 6.00 | 4,800 | | |
| clean, prep | 800 | sf | 2.00 | 1,600 | | |
| paint | 800 | sf | 4.50 | 3,600 | | |
| reinstall | 800 | sf | 15.00 | 12,000 | | |
| allow to replace 10% | 75 | sf | 65.00 | 4,875 | | allowance |
| Sub-total | 100,085 | sf | 0.27 | /sf | 26,875 | |
| SUB-TOTAL 10 \| Louvers | | | | | **$26,875** | |
| **11 \| Exterior Handrails & Guardrails** | | | | | | |
| clean, prep, repaint guardrails | 250 | lf | 25.00 | 6,250 | | |
| clean, prep, repaint handrails | 104 | lf | 10.00 | 1,040 | | |
| Sub-total | 100,085 | sf | 0.07 | /sf | 7,290 | |
| SUB-TOTAL 11 \| Exterior Handrails & Guardrails | | | | | **$7,290** | |
| **12 \| Roof & Penthouse Elements** | | | | | | |
| Roofing | | | | | | |
| item | | sf | 0.00 | 0 | | NIC - separate contract |
| Sub-total | 100,085 | sf | 0.00 | /sf | 0 | |
| Penthouse Elements | | | | | | |
| item | | sf | 0.00 | 0 | | NIC - separate contract |
| Sub-total | 100,085 | sf | 0.00 | /sf | 0 | |
| SUB-TOTAL 12 \| Roof & Penthouse Elements | | | | | **$0** | |

| | | |
|---|---|---|
| **Exterior Assessment + Rehabilitation S** | *Architectural Cost Consultants, LLC* | Estimate Date: 18-Mar-13 |
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: 18-Mar-13 |
| FFA Architecture + Interiors | Tigard, Oregon 97223-8489 | Print Time: 9:45 AM |
| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: Spring 2014 |

| **Option B** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| **SUB-TOTAL** | | | 79.56 | 7,962,898 | **$7,962,898** | |
| Estimating Contingency | | | 20.00% | 1,592,580 | | |
| Phasing | | | 5.00% | 477,774 | | |
| Index To Construction Start | Spring 2014 | | 3.00% | 300,998 | | @ ± 3% per year |
| CM/GC Contingency | | | 7.50% | 775,069 | | |
| General Conditions / Insurance / Bond | | | 10.00% | 1,110,932 | | |
| General Contractor OH & Profit | | | 4.00% | 488,810 | 4,746,161 | 59.60% |
| **TOTAL DIRECT CONSTRUCTION COST** | | | | | | |
| **Option B** | **100,085** | **sf** | **$126.98** | **/sf** | **$12,709,059** | |
| North Elevation | 26,275 | sf | | | | |
| South Elevation | 26,275 | sf | | | | |
| East Elevation | 24,450 | sf | | | | |
| West Elevation | 23,085 | sf | | | | |

Structural Upgrade

| **Structural Upgrade** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| **01 \| General Requirements** | | | | | | |
| Hoisting / Scaffolding / Temp Work | | | | | | |
| scaffold / weather enclosure | 100,085 | sf | $1.00 | $100,085 | | premium for strlr work rqrmts |
| temp interior barriers | 100,085 | sf | 5.50 | 550,468 | | premium - heavy duty temp wall |
| temp sidewalk fall protection | 8,600 | sf | 0.00 | 0 | | w/ enclosure work |
| crane / hoisting | 8 | mo | 70,000.00 | 560,000 | | added duration |
| barricades / flagging | 1 | sum | 60,000.00 | 60,000 | | increase for more activity/ nights |
| Sub-total | 560,000 | sf | 2.27 | /sf | $1,270,553 | |
| SUB-TOTAL 01 \| General Requirements | | | | | **$1,270,553** | |
| **13 \| Concrete Work** | | | | | | |
| Demolition / Earthwork | | | | | | |
| sawcut garage slab | 544 | lf | 10.00 | 5,440 | | |
| remove slab | 3,199 | sf | 5.00 | 15,995 | | |
| excavate | 231 | cy | 100.00 | 23,100 | | |
| haul & disposal | 278 | cy | 50.00 | 13,917 | | |
| temp barricades / protect | 4 | ea | 500.00 | 2,000 | | |
| Sub-total | 560,000 | sf | 0.11 | /sf | 60,452 | |
| Forming | | | | | | |
| footings | | sf | 0.00 | 0 | | assume "neat" (earth formed) |
| corner columns | 5,333 | sf | 11.50 | 61,330 | | |
| middle columns | 22,400 | sf | 10.25 | 229,600 | | |
| upper corner + middle column | 9,000 | sf | 10.25 | 92,250 | | |
| corner column encasement | 3,499 | sf | 10.25 | 35,865 | | |
| middle column encasement | 14,286 | sf | 10.25 | 146,432 | | |
| column encasement 15th floor | 1,600 | sf | 10.25 | 16,400 | | |
| column encasement 16th floor | 976 | sf | 10.25 | 10,004 | | |
| column encasement 17th floor | 907 | sf | 10.25 | 9,297 | | |
| beam, floors 1-3 | 14,076 | sf | 12.50 | 175,950 | | |
| beam, floors 4-15 | 49,063 | sf | 12.50 | 613,288 | | |
| beam, floor 16 | 3,360 | sf | 12.50 | 42,000 | | |
| beam, floor 17 | 1,238 | sf | 12.50 | 15,475 | | |
| beam, floor 18 | 990 | sf | 12.50 | 12,375 | | |
| misc. forming accessories | 1 | sum | 73,013.30 | 73,013 | | |
| Sub-total | 560,000 | sf | 2.74 | /sf | 1,533,279 | |
| Specialty Work / Drilling / Doweling / Chipping | | | | | | |
| dtl SSK14 | | | | | | |
| partially chip slab/ deck - 7" dpth. | 9,540 | lf | 35.00 | 333,900 | | |
| drill & epoxy thru exist, conc. bm vert. | 28,620 | ea | 25.00 | 715,500 | | assume 3 ea / lf, verify |
| roughen slab underside | 9,540 | lf | 10.00 | 95,400 | | |
| premium time for off-hours work | 1 | sum | 85,860.00 | 85,860 | | |
| | | | | | 1,230,660 | |
| dtl SSK15 | | | | | | |
| chip conc. slab / deck | 316 | lctns | 150.00 | 47,400 | | |
| temp shore | 316 | lctns | 350.00 | 110,600 | | |
| premium time for off-hours work | 1 | sum | 11,850.00 | 11,850 | | |
| | | | | | 169,850 | |
| dtl SSK16 | | | | | | |
| drill & epoxy r/s dowels @ exist. column | 12,886 | ea | 125.00 | 1,610,750 | | verify qty. |
| premium time for off-hours work | 1 | sum | 120,806.25 | 120,806 | | |
| | | | | | 1,731,556 | |
| Sub-total | 560,000 | sf | 5.59 | /sf | 3,132,066 | |

| **Structural Upgrade** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| 13 \| Concrete Work - Continued | | | | | | |
| Reinforcing Steel | | | | | | |
| footings | 80,850 | lbs | 0.90 | 72,765 | | 350# /cy |
| corner columns | 72,000 | lbs | 0.90 | 64,800 | | 180# / lf |
| middle columns | 288,000 | lbs | 0.90 | 259,200 | | 180# / lf |
| upper corner + middle column | 93,750 | lbs | 0.90 | 84,375 | | 125# /lf |
| corner column encasement | 43,734 | lbs | 0.90 | 39,361 | | 200# / lf |
| middle column encasement | 174,935 | lbs | 0.90 | 157,442 | | 200# / lf |
| column encasement 15th floor | 30,000 | lbs | 0.90 | 27,000 | | 200# / lf |
| column encasement 16th floor | 19,520 | lbs | 0.90 | 17,568 | | 200# / lf |
| column encasement 17th floor | 18,133 | lbs | 0.90 | 16,320 | | 200# / lf |
| beam, floors 1-3 | 250,240 | lbs | 0.90 | 225,216 | | 160# / lf |
| beam, floors 4-15 | 800,000 | lbs | 0.90 | 720,000 | | 125# / lf |
| beam, floor 16 | 57,600 | lbs | 0.90 | 51,840 | | 160# / lf |
| beam, floor 17 | 18,750 | lbs | 0.90 | 16,875 | | 125# / lf |
| beam, floor 18 | 15,000 | lbs | 0.90 | 13,500 | | 125# / lf |
| Sub-total | 560,000 | sf | 3.15 | /sf | 1,766,262 | |
| Redi-Mix Concrete | | | | | | verify psi rqrmnts + admixtures |
| footings | 231 | cy | 120.00 | 27,720 | | |
| corner columns | 173 | cy | 120.00 | 20,760 | | |
| middle columns | 747 | cy | 120.00 | 89,640 | | |
| upper corner + middle column | 263 | cy | 120.00 | 31,560 | | |
| corner column encasement | 68 | cy | 120.00 | 8,160 | | |
| middle column encasement | 278 | cy | 120.00 | 33,360 | | |
| column encasement 15th floor | 32 | cy | 120.00 | 3,840 | | |
| column encasement 16th floor | 12 | cy | 120.00 | 1,440 | | |
| column encasement 17th floor | 12 | cy | 120.00 | 1,440 | | |
| beam, floors 1-3 | 548 | cy | 120.00 | 65,760 | | |
| beam, floors 4-15 | 1,742 | cy | 120.00 | 209,040 | | |
| beam, floor 16 | 140 | cy | 120.00 | 16,800 | | |
| beam, floor 17 | 40 | cy | 120.00 | 4,800 | | |
| beam, floor 18 | 32 | cy | 120.00 | 3,840 | | |
| transport / pump / addtnl labor | 4,318 | cy | 40.00 | 172,720 | | |
| Sub-total | 560,000 | sf | 1.23 | /sf | 690,880 | |
| Placing | | | | | | |
| footings | 231 | cy | 40.00 | 9,240 | | |
| corner columns | 173 | cy | 95.00 | 16,435 | | |
| middle columns | 747 | cy | 95.00 | 70,965 | | |
| upper corner + middle column | 263 | cy | 95.00 | 24,985 | | |
| corner column encasement | 68 | cy | 95.00 | 6,460 | | |
| middle column encasement | 278 | cy | 95.00 | 26,410 | | |
| column encasement 15th floor | 32 | cy | 95.00 | 3,040 | | |
| column encasement 16th floor | 12 | cy | 95.00 | 1,140 | | |
| column encasement 17th floor | 12 | cy | 95.00 | 1,140 | | |
| beam, floors 1-3 | 548 | cy | 80.00 | 43,840 | | |
| beam, floors 4-15 | 1,742 | cy | 80.00 | 139,360 | | |
| beam, floor 16 | 140 | cy | 80.00 | 11,200 | | |
| beam, floor 17 | 40 | cy | 80.00 | 3,200 | | |
| beam, floor 18 | 32 | cy | 80.00 | 2,560 | | |
| Sub-total | 560,000 | sf | 0.64 | /sf | 359,975 | |

| **Structural Upgrade** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| 13 \| Concrete Work - Continued | | | | | | |
| Finishing | | | | | | |
| finish / seal garage footing / slab | 3,199 | sf | 1.50 | 4,799 | | |
| columns | 58,001 | sf | 1.75 | 101,502 | | |
| beams | 68,727 | sf | 1.25 | 85,909 | | |
| Sub-total | 560,000 | sf | 0.34 | /sf | 192,210 | |
| SUB-TOTAL 13 \| Concrete Work | | | | | **$7,735,124** | |
| **14 \| Structural Steel** | | | | | | |
| Structural Steel | | | | | | |
| HSS columns | 14.9 | tons | 4,500.00 | 66,839 | | |
| interior rigging / handling | 2 | floors | 10,000.00 | 20,000 | | |
| connections, misc. | 25.0% | of | 86,839.00 | 21,710 | | |
| Sub-total | 560,000 | sf | 0.19 | /sf | 108,549 | |
| SUB-TOTAL 14 \| Structural Steel | | | | | **$108,549** | |
| **15 \| Additional Interior Finishes** | | | | | | |
| Garage Level | | | | | | |
| remove partitions | 70 | lf | 20.00 | 1,400 | | |
| remove door | 4 | ea | 100.00 | 400 | | |
| misc. removals | 8 | lctns | 250.00 | 2,000 | | |
| install partitions | 70 | lf | 200.00 | 14,000 | | |
| install doors | 4 | ea | 1,600.00 | 6,400 | | |
| paint, etc. | 1 | sum | 3,000.00 | 3,000 | | |
| misc. reinstalls | 8 | lctns | 150.00 | 1,200 | | |
| temp barricade / protect / cleanup | 20 | lctns | 125.00 | 2,500 | | |
| | | | | | | 30,900 |
| 1st, 2nd & 3rd Floors | | | | | | |
| to install HSS columns | | | | | | |
| demo to install new HSS columns | 56 | lctns | 200.00 | 11,200 | | |
| wall patch / repair to match existing | 56 | lctns | 500.00 | 28,000 | | |
| temp barricade / protect / cleanup | 56 | lctns | 250.00 | 14,000 | | |
| | | | | | | 53,200 |
| to install concrete work | | | | | | |
| remove storefront | | sf | 0.00 | 0 | | NIC - w/ enclosure work |
| demo to install concrete @ columns | | | | | | |
| minimal | 24 | lctns | 100.00 | 2,400 | | stand alone, no ptns, etc. |
| average | 18 | lctns | 150.00 | 2,700 | | |
| maximum | 18 | lctns | 250.00 | 4,500 | | heavy interface w/ finishes |
| demo to install concrete beams | | | | | | assume 12' set back |
| remove floor finishes | 23,040 | sf | 0.75 | 17,280 | | |
| remove ceiling finishes | 23,040 | sf | 0.85 | 19,584 | | |
| repair to match existing | | | | | | |
| minimal | 24 | lctns | 1,000.00 | 24,000 | | |
| average | 18 | lctns | 1,750.00 | 31,500 | | |
| maximum | 18 | lctns | 4,000.00 | 72,000 | | |
| reinstall carpet / floor finishes | 23,040 | sf | 6.00 | 138,240 | | |
| reinstall ceiling / repair / patch | 23,040 | sf | 8.00 | 184,320 | | |
| misc. interface / cutover | 12 | sctns | 1,000.00 | 12,000 | | |

| **Exterior Assessment + Rehabilitation S** | *Architectural Cost Consultants, LLC* | Estimate Date: | 18-Mar-13 |
|---|---|---|---|
| The Portland Building | Stanley J. Pszczolkowski, AIA | Document Date: | 08-Jan-13 |
| Portland, Oregon | 8060 SW Pfaffle Street, Suite 110 | Print Date: | 18-Mar-13 |
| FFA Architecture + Interiors | Tigard, Oregon 97223-8489 | Print Time: | 9:45 AM |
| Rehab Study Probable Cost 1.3 | Phone (503) 718-0075 Fax (503) 718-0077 www.archcost.com | Constr. Start: | Spring 2014 |

| **Structural Upgrade** | Quantity | Unit | Cost / Unit | Cost | Sub-totals | Comments |
|---|---|---|---|---|---|---|
| 15 \| Additional Interior Finishes - Continued | | | | | | |
| 1st, 2nd & 3rd Floors - continued | | | | | | |
| temp wall / dust / noise partition | 19,200 | sf | 10.00 | 192,000 | | |
| protect / cleanup | 23,040 | sf | 2.50 | 57,600 | | |
| misc. electrical / systems repair / adjust | 23,040 | sf | 4.34 | 100,000 | | allowance |
| | | | | | | 858,124 |
| Upper Floors | | | | | | |
| remove gypboard | 77,379 | sf | 0.00 | 0 | | w/ enclosure work |
| remove insulation | 77,379 | sf | 0.00 | 0 | | w/ enclosure work |
| remove ACT ceiling, back 4'0" frm ext. wall | 39,936 | sf | 0.85 | 33,946 | | add addtnl 6' |
| remove flooring | 66,560 | sf | 0.75 | 49,920 | | |
| remove metal sill, salvage, conc. opng | 1,798 | lf | 0.00 | 0 | | w/ enclosure work |
| remove metal sill, salvage, curtain wall | 1,048 | lf | 0.00 | 0 | | w/ enclosure work |
| remove metal sill, salvage, ribbon window | 232 | lf | 0.00 | 0 | | w/ enclosure work |
| haul & disposal | 1 | sum | 16,773.20 | 16,773 | | |
| new batt insulation | 77,379 | sf | 0.00 | 0 | | w/ enclosure work |
| new vapor barrier | 77,379 | sf | 0.00 | 0 | | w/ enclosure work |
| partitions which interfere w/ bm / clmn work | 14 | levels | 20,000.00 | 280,000 | | allowance |
| new gypboard, vertical wall | 77,379 | sf | 0.00 | 0 | | w/ enclosure work |
| new gypboard, head | 3,078 | lf | 0.00 | 0 | | w/ enclosure work |
| new gypboard, jamb | 7,455 | lf | 0.00 | 0 | | w/ enclosure work |
| install new ceiling | 39,936 | sf | 4.00 | 159,744 | | add addtnl 6' |
| reinstall metal sill | 3,078 | lf | 0.00 | 0 | | w/ enclosure work |
| floor prep | 66,560 | sf | 0.75 | 49,920 | | |
| install carpet / floor finishes | 66,560 | sf | 4.00 | 266,240 | | |
| base, rubber | 7,916 | lf | 0.00 | 0 | | w/ enclosure work |
| paint gypboard | 71,244 | sf | 0.00 | 0 | | w/ enclosure work |
| misc. patch / touchup | 77,379 | sf | 0.00 | 0 | | w/ enclosure work |
| mech / electrical, remove / reinstall devices | 14 | levels | 6,000.00 | 84,000 | | additional |
| Sub-total | 560,000 | sf | 3.36 | /sf | 1,882,767 | |
| SUB-TOTAL 15 \| Additional Interior Finishes | | | | | **$1,882,767** | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **SUB-TOTAL** | | | 19.64 | 10,996,993 | **$10,996,993** | |
| Estimating Contingency | | | 15.00% | 1,649,549 | | |
| Phasing | | | 5.00% | 632,327 | | |
| Index To Construction Start | Spring 2014 | | 3.00% | 398,366 | | @ ± 3% per year |
| CM/GC Contingency | | | 7.50% | 1,025,793 | | |
| General Conditions / Insurance / Bond | | | 10.00% | 1,470,303 | | |
| General Contractor OH & Profit | | | 4.00% | 646,933 | 5,823,271 | 52.95% |
| **TOTAL DIRECT CONSTRUCTION COST** | | | | | | |
| **Structural Upgrade** | **560,000** | **sf** | **$30.04** | **/sf** | **$16,820,264** | |
| North Elevation | 26,275 | sf | | | | |
| South Elevation | 26,275 | sf | | | | |
| East Elevation | 24,450 | sf | | | | |
| West Elevation | 23,085 | sf | | | | |