



FIXING AN ICON

THE UF
ARCHITECTURE
BUILDING



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Learning Objectives

1

Identify a history of failures through field investigations

2

Using historical drawing archaeology to identify past mistakes

3

Using modern investigation techniques

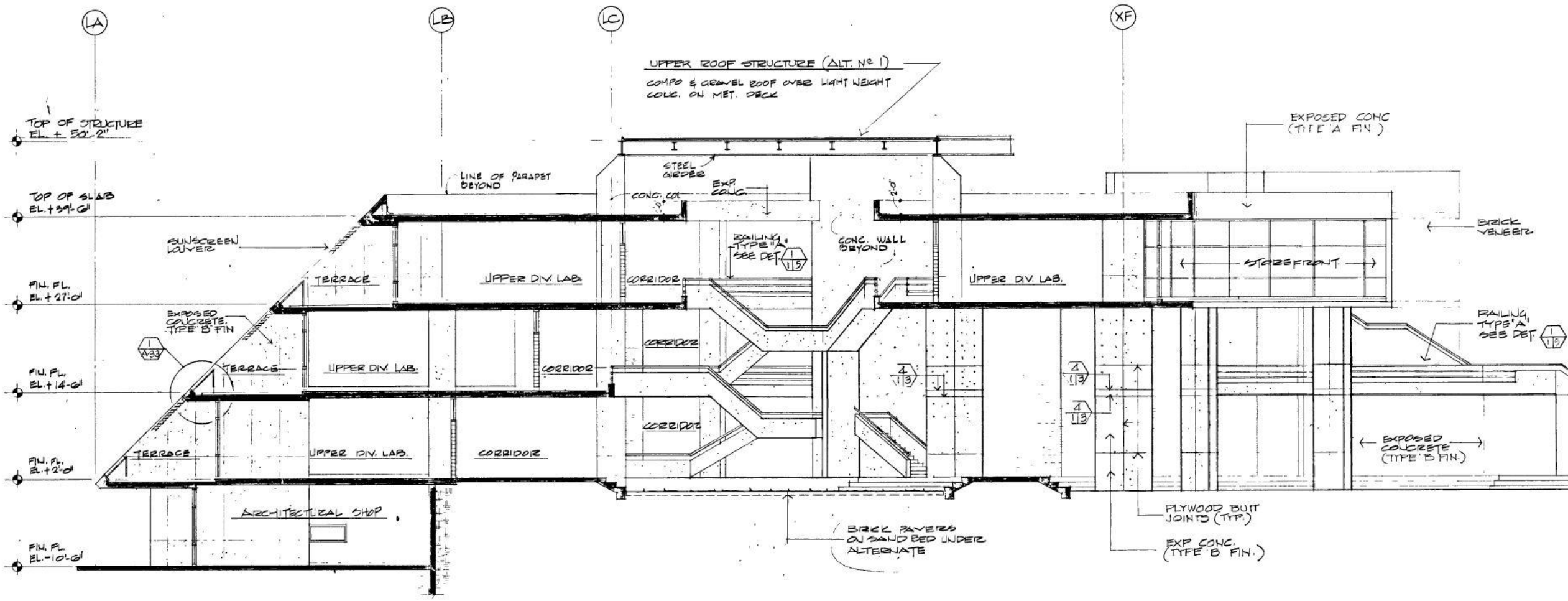
4

Generating quantitative solutions to fix long term issues

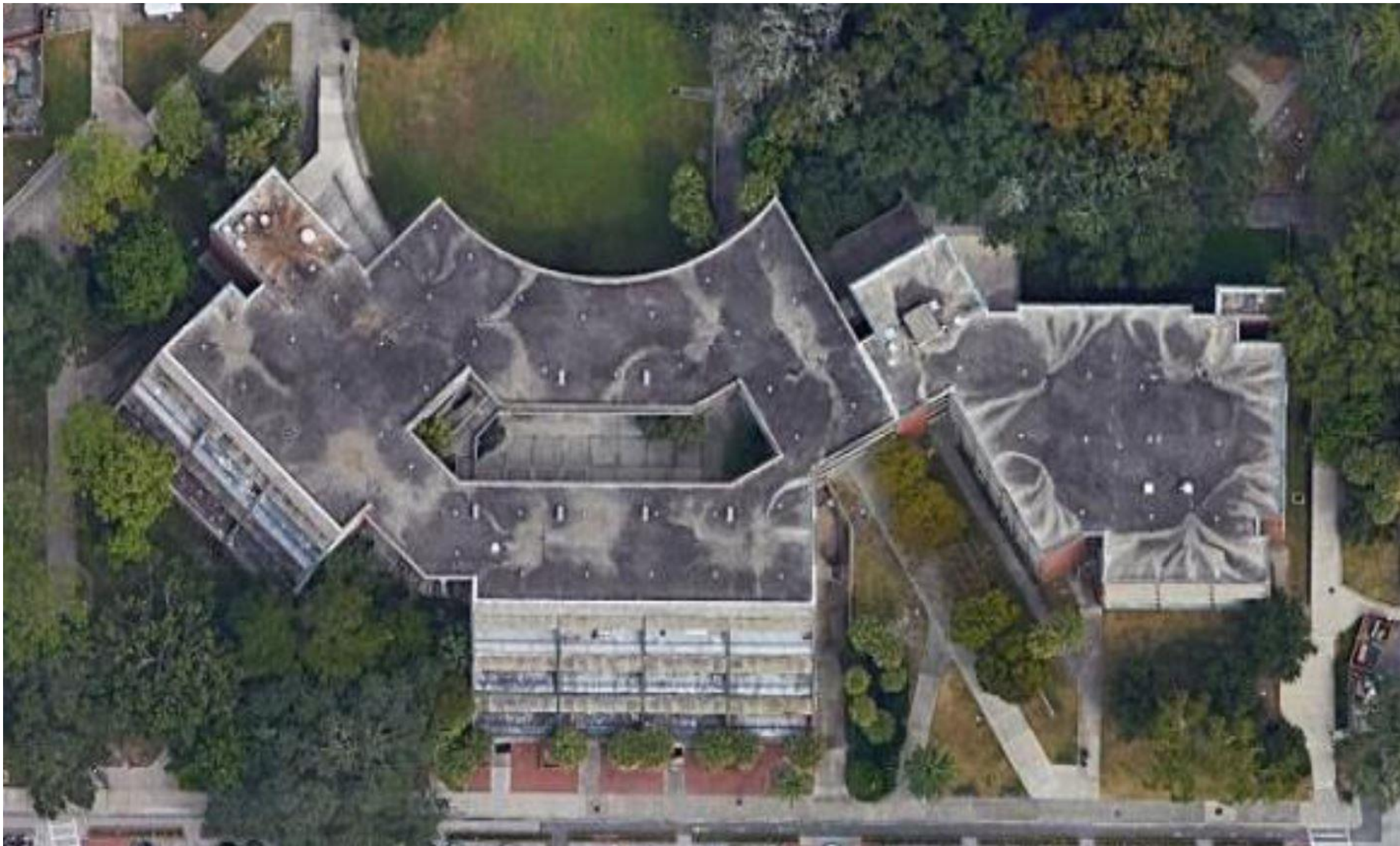


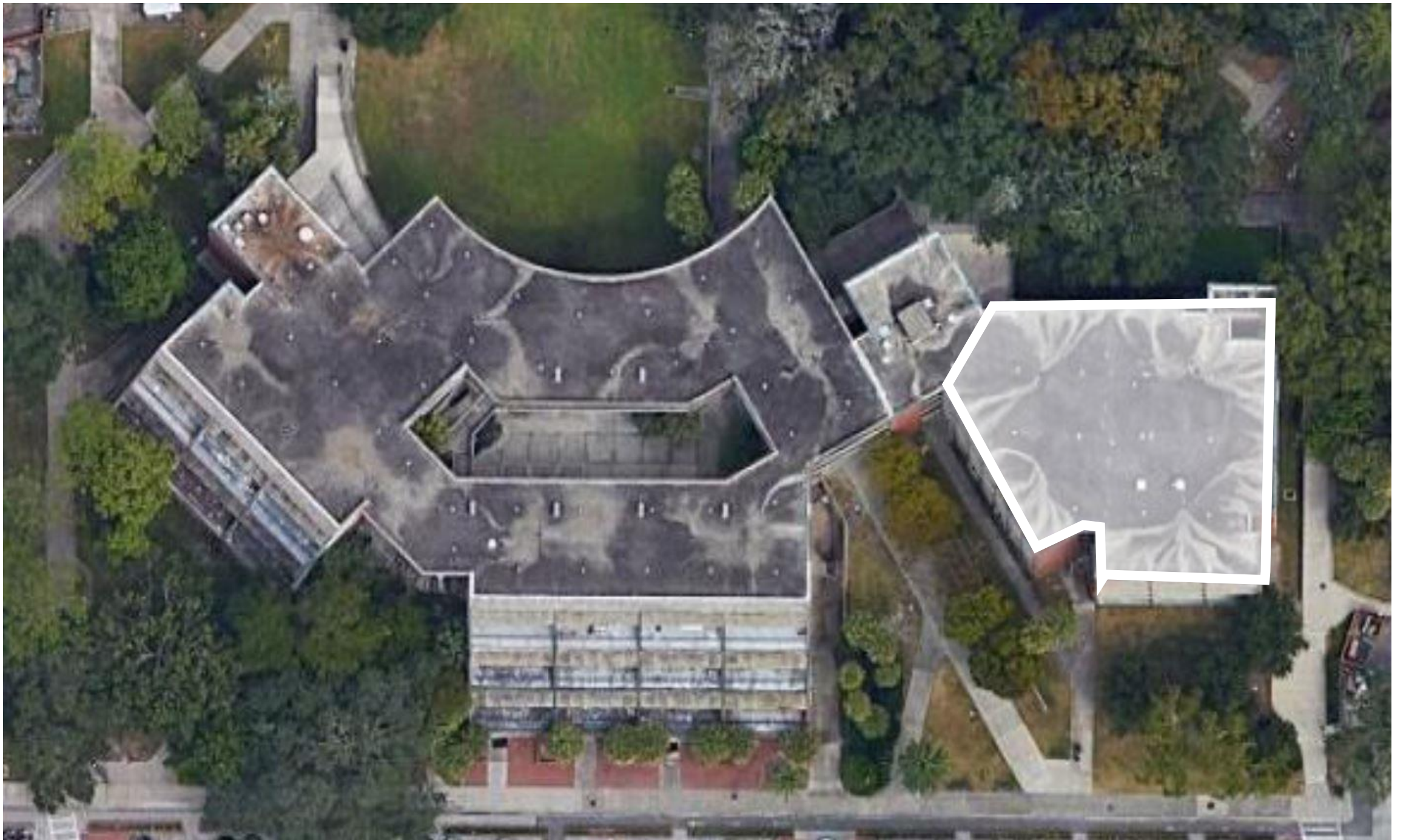
School of
Landscape Architecture
& Planning

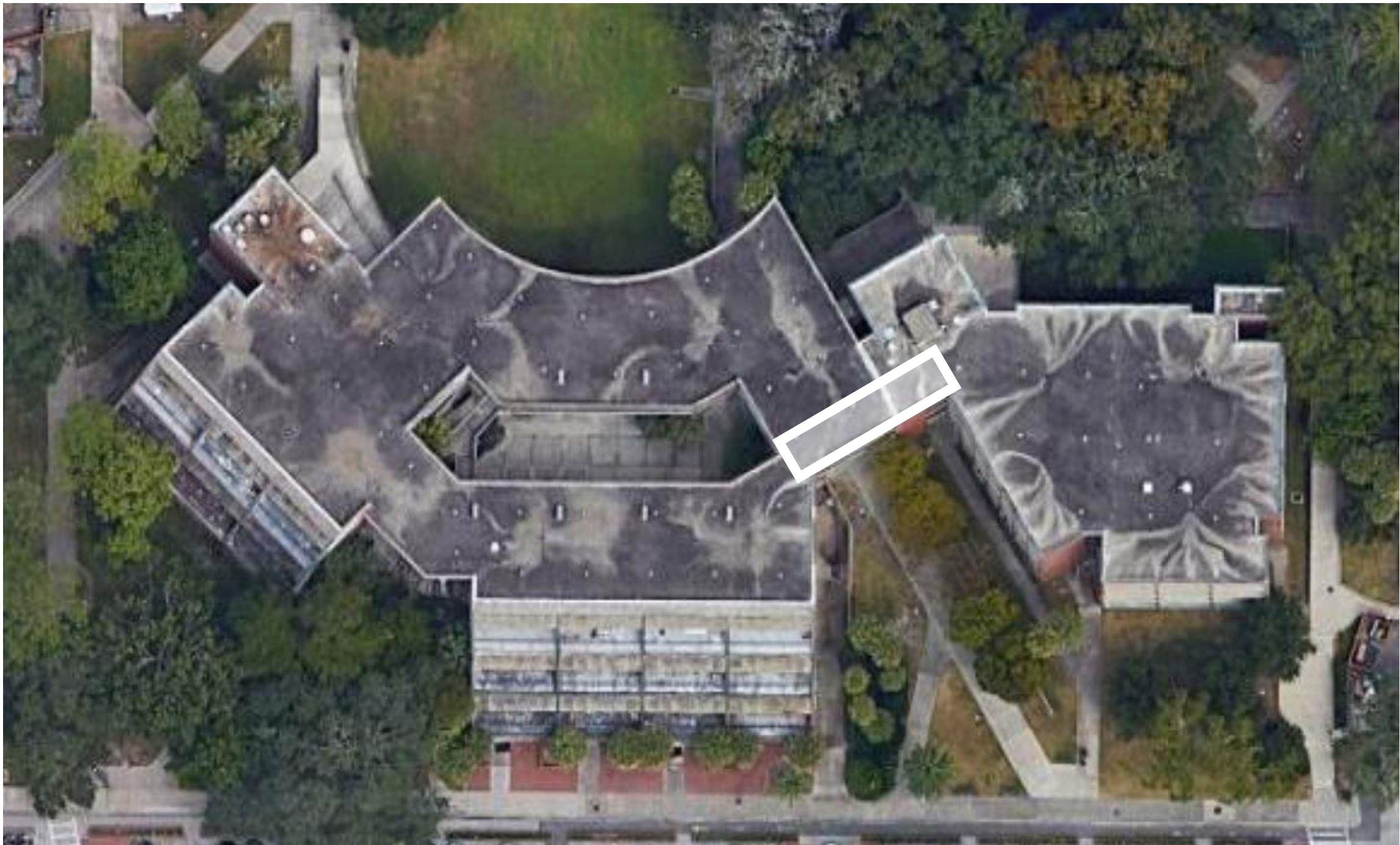
M.E. Rinker, Sr. School of
Construction
Management



SECTION
 1/8" = 1'-0"











Project Overview & Conditions

- Budget
- Envelope Issues
- Active Campus During Construction
- Student Involvement

Project Priorities

1

Envelope

2

Atrium Canopy

3

Rain Screen

1

ENVELOPE

Provide a complete weather proofed envelope for the entire building and particular attention to the classroom areas of the existing Architecture building including:

- a. Exterior Storefront Assemblies
- b. Interior Corridor Storefront Assemblies
- c. Exterior Cast in Place and Brick Wall Assemblies
- d. Existing Roof
- e. Existing Roof Drainage Systems

2

ATRIUM CANOPY

Design and construction of an atrium canopy or rain screen with the following qualities:

- a. Allows heat to escape
- b. Block wind driven rain
- c. Does not encourage birds to nest
- d. Does not permit the accumulation of debris, leaf litter, etc.
- e. Retains natural light in the atrium
- f. Durable and treated to prevent from fogging or discoloring over time

3

RAIN SCREEN

Provide a design for the CM to develop a cost estimate for a rain screen system to mitigate water intrusion and associated ponding in the exterior walkways (beyond atrium opening) in the existing building. Construction will proceed if funds are available.

Objectives

1

Building Investigation

Identify a history of failures through field investigations

2

Drawing Archeology

Using historical drawing archaeology to identify past mistakes

3

Modern Techniques

Using modern investigation techniques

4

Generating Solutions

Generating quantitative solutions to fix long term issues



BUILDING INVESTIGATION

1

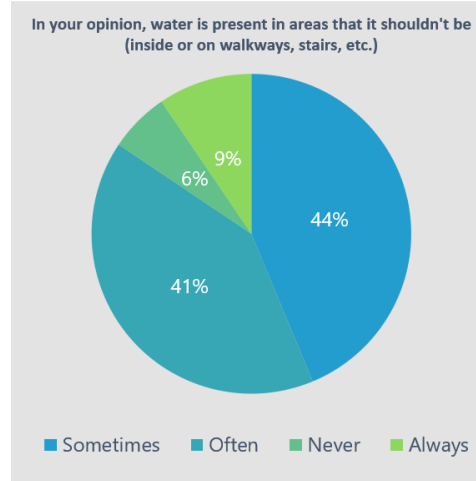
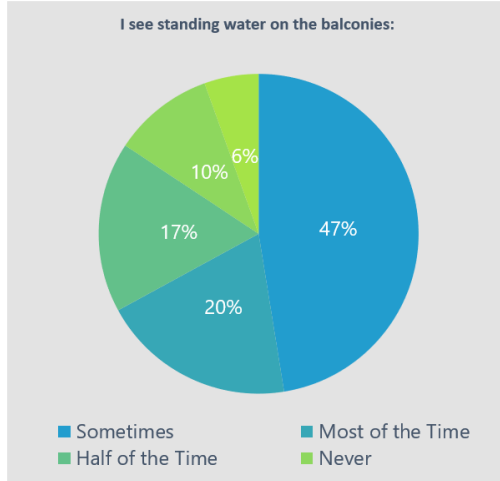
BUILDING INVESTIGATION

1. Accessing and documenting the existing condition of every balcony
2. Observation of classrooms showing water intrusion after a light rain.
3. Accessing and investigating and photographing parapet, flashing, equipment curbs, lightning protection system and other miscellaneous items found on the roof
4. Student and Faculty engagement

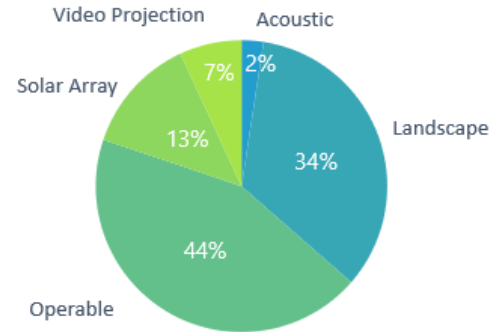
INVESTIGATION



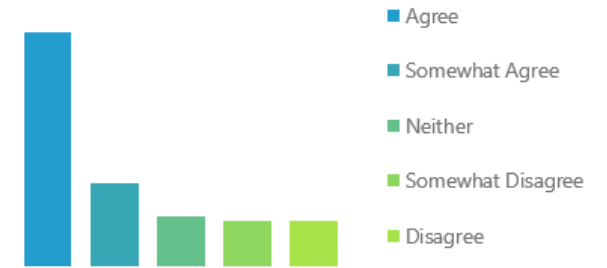
STUDENT & FACULTY ENGAGEMENT



What should be integrated in the canopy design?

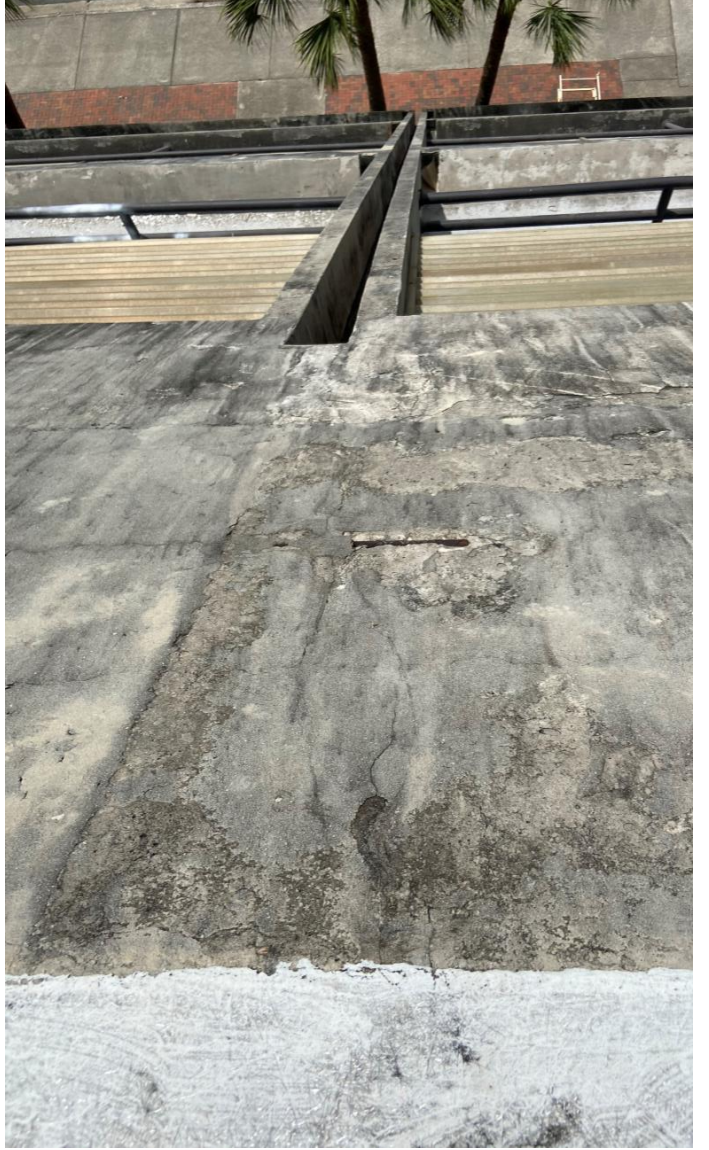
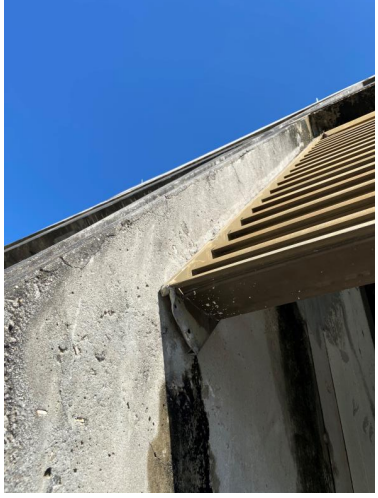
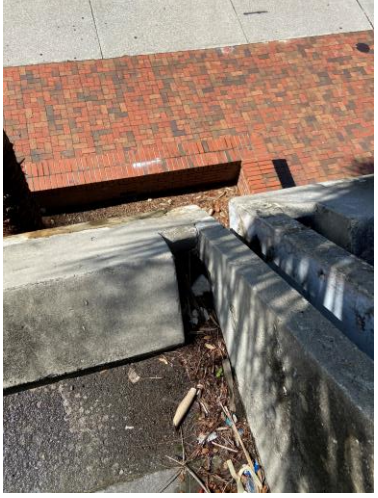


If there was a canopy... Prevention of water on stairs and circulation areas must be ensured.

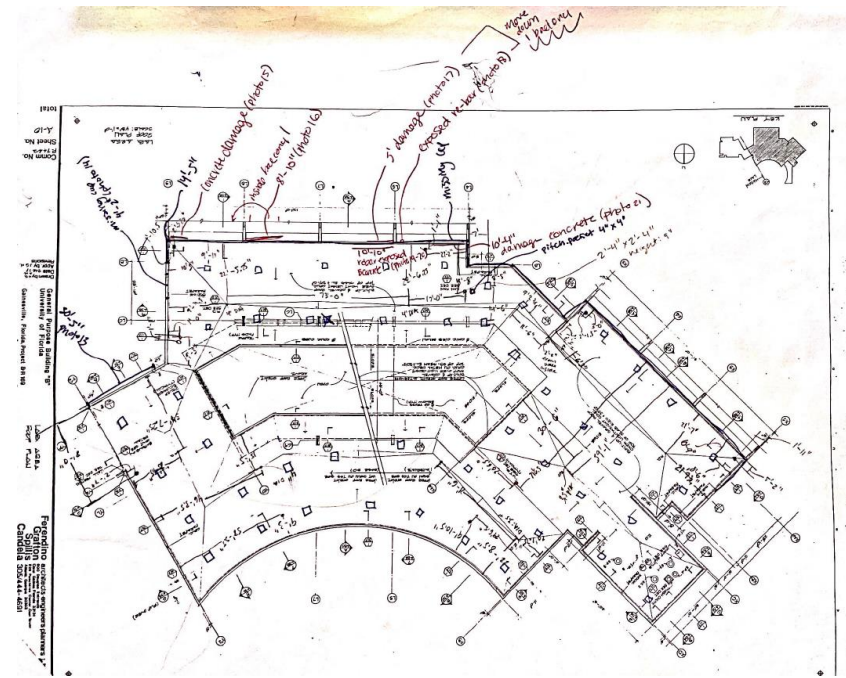
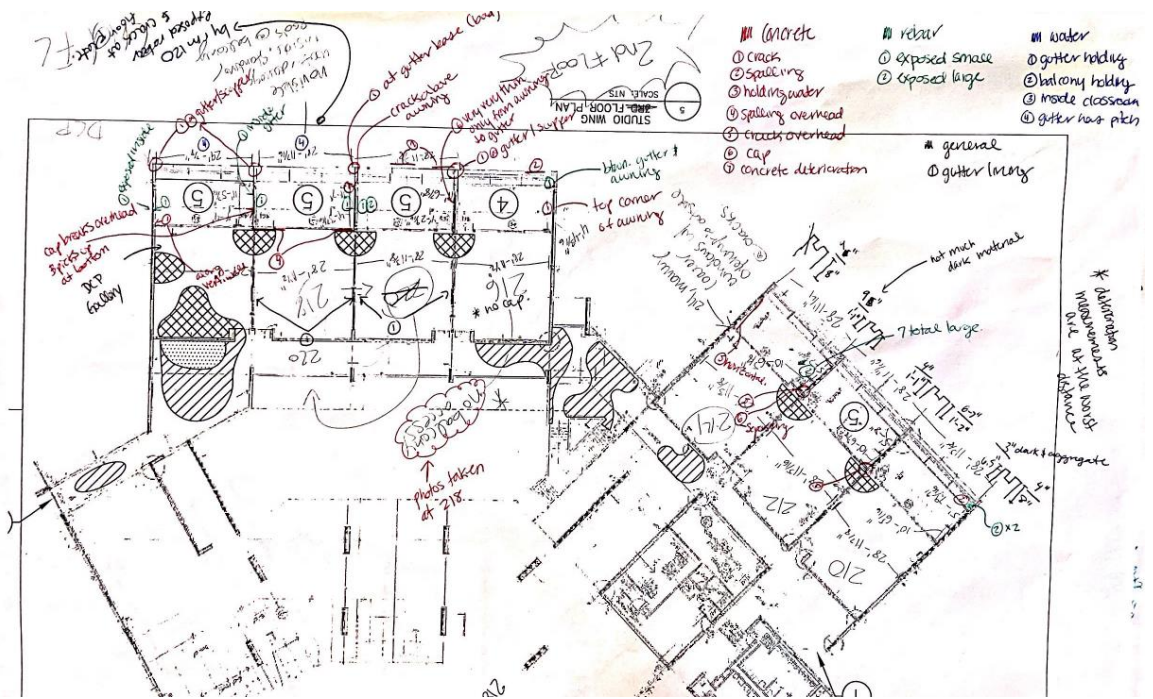


STUDENT & FACULTY PHOTOS





BUILDING INVESTIGATION





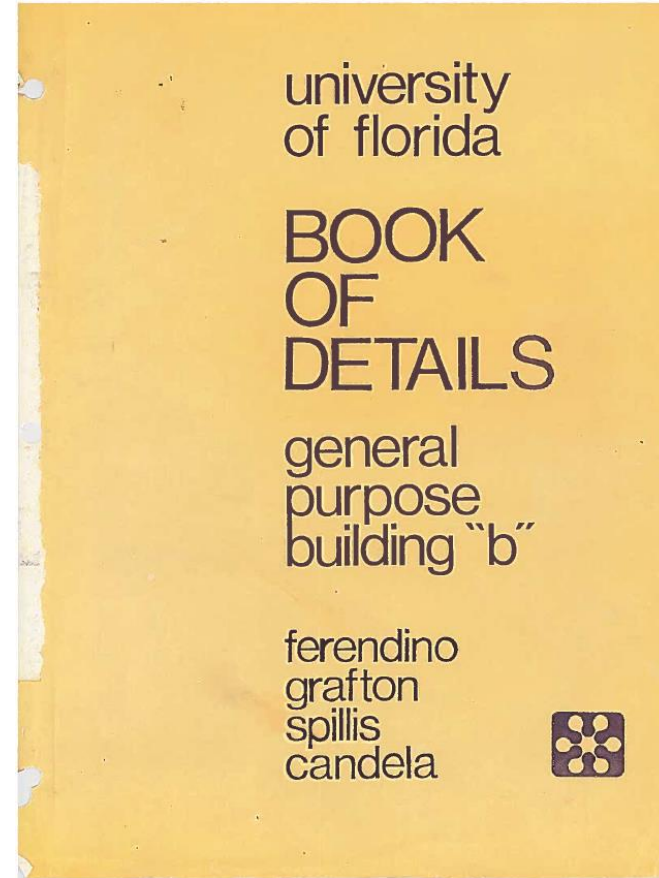
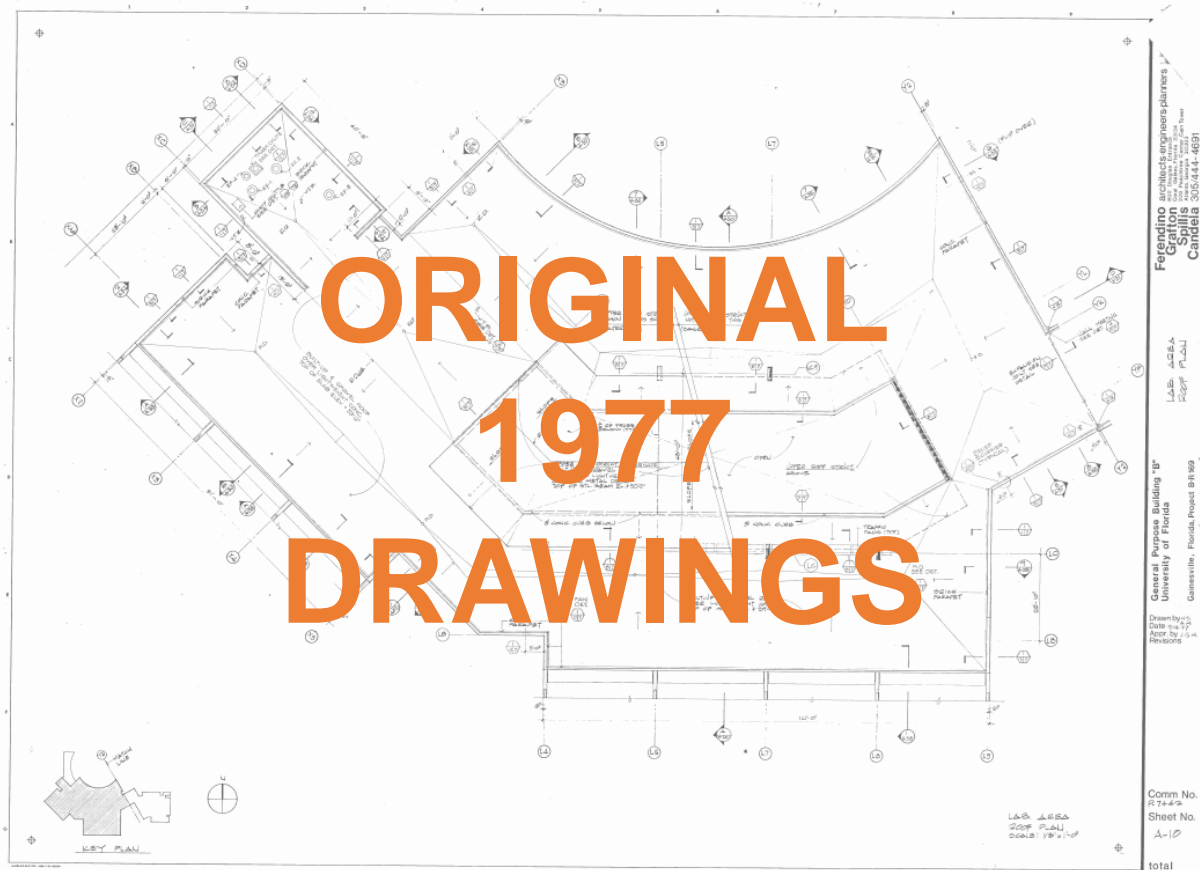
DRAWING ARCHAEOLOGY

2

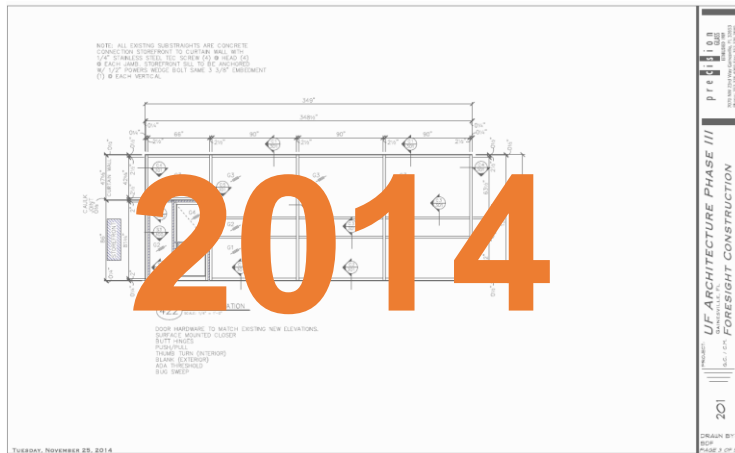
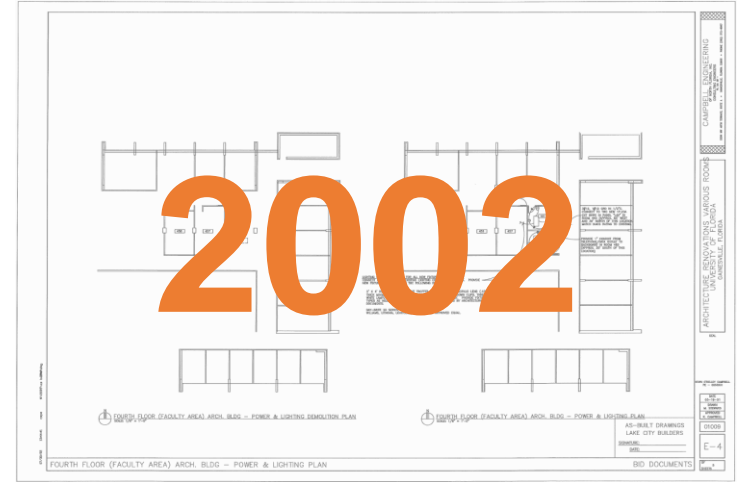
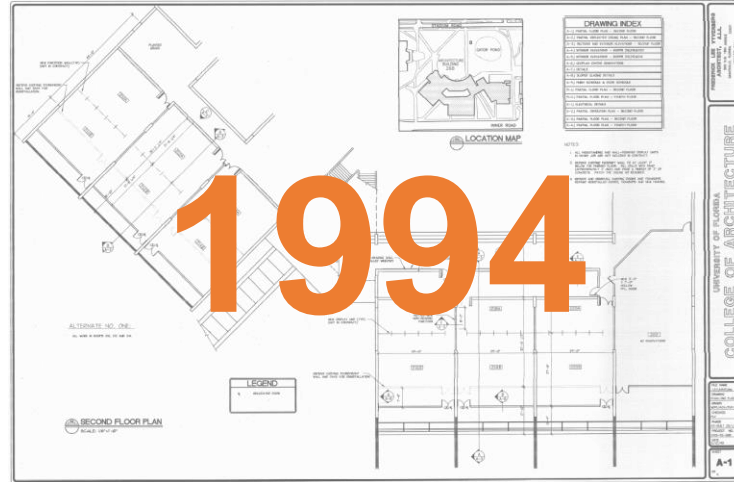
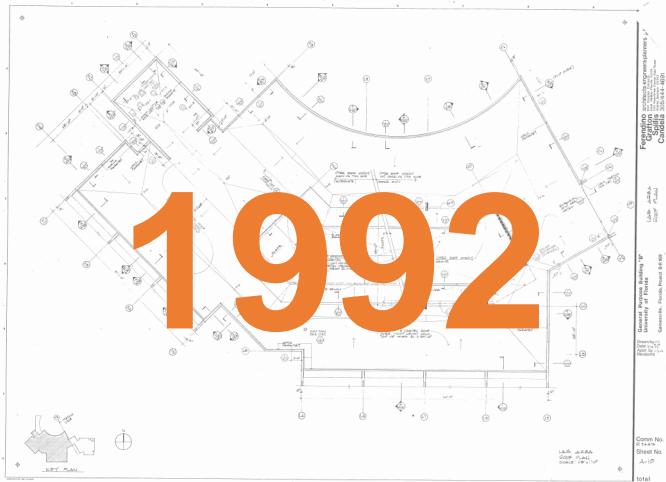
DRAWING ARCHAEOLOGY

1. Original Building Construction Documents
2. Original Building Detail Book (separate of the drawings)
3. Drawings for all Alterations
 - a. 1992
 - b. 1994
 - c. 2002
 - d. 2014
 - e. 2016
 - f. (Did not receive drawings of the newer curtainwall installation in the atrium area)

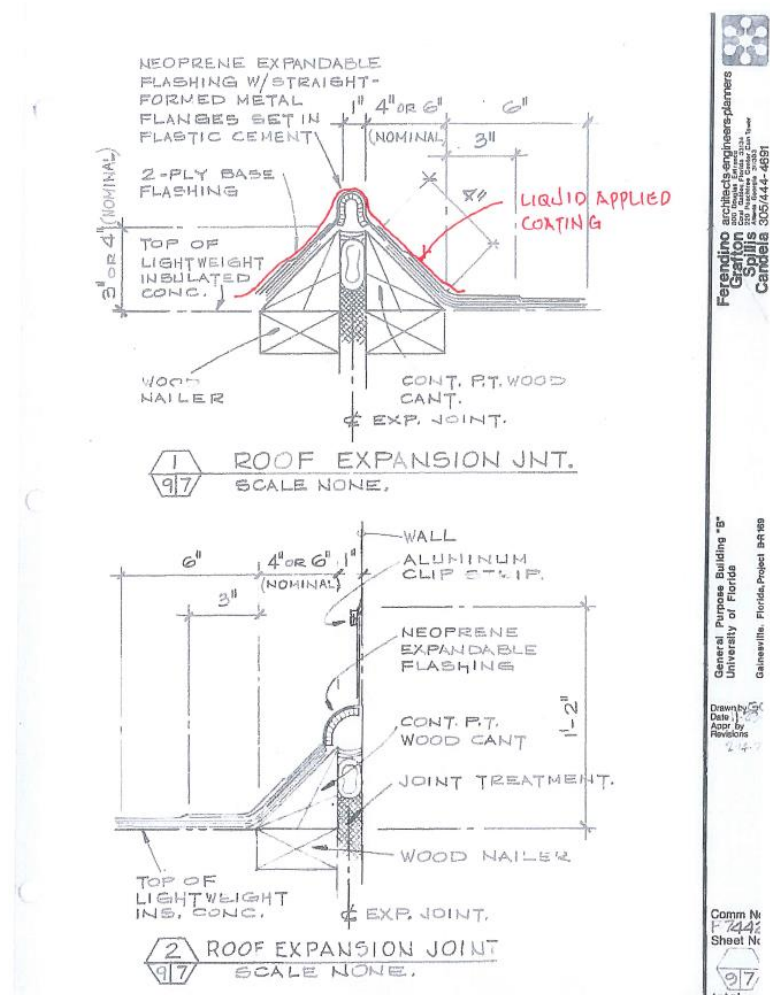
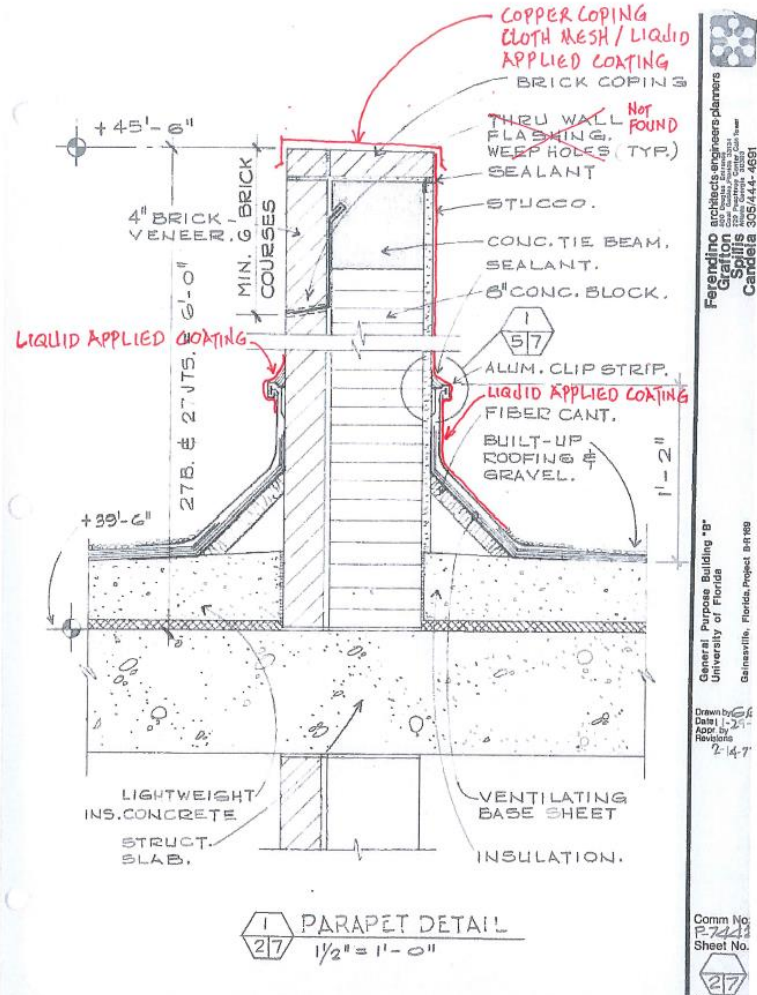
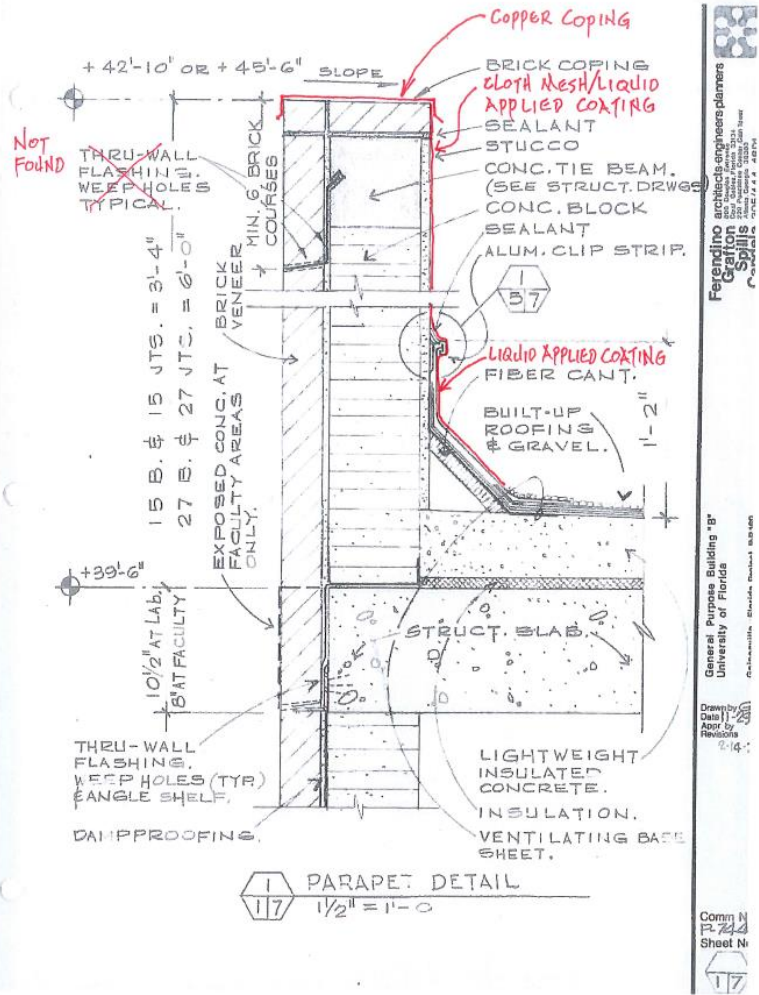
ORIGINAL DRAWINGS INVESTIGATION



ALTERATIONS INVESTIGATION



DETAILED INVESTIGATION



DRAWING ARCHAEOLOGY



MODERN TECHNIQUES

3

MODERN TECHNIQUES

1. Core drilling roof in multiple locations to determine the approximate thickness of the lightweight fill and the slope on the roof
2. Thermal scan of the roof looking for moisture in the lightweight insulation materials.
3. Water stream testing of the back of the parapet determined by PSI our testing Consultant
4. Water stream testing of the exterior masonry and masonry to concrete wall joint areas.

CORE DRILLING



Photo 19: Photo to show general location of Core #1 at the south section of the East Wing roof area. See [Photo 20](#).



Photo 20: General location of core samples #1 and #2 at the East Wing roof area.

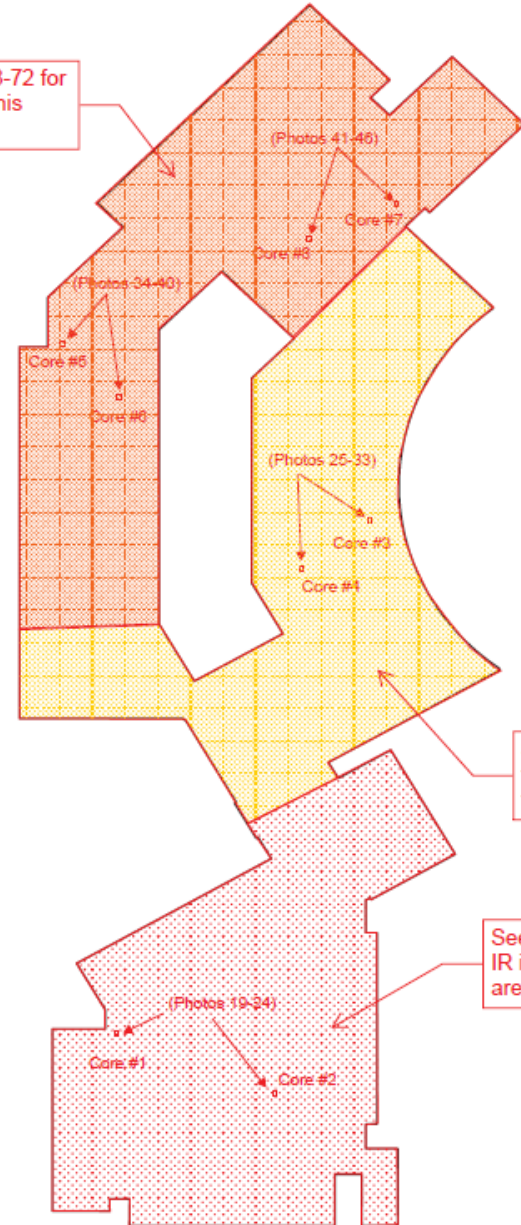


Photo 21: Core samples revealed the sloped roof substrate being a Zonolite LWIC material, over approximately 1 inch of Styrofoam insulation, [Photo 29](#). The depth of the roof assembly at Core #1 was approximately 6 1/4 inches.



Photo 22: The depth of the roof assembly at Core #2 was approximately 6 1/4 inches. Based on the distance of approximately 50 feet between the two core samples, see [Photo 20](#), the slope is minimal at 1/4 inch within 50 feet.

See Photos 68-72 for IR images of this area.



See Photos 59-67 for IR images of this area.

See Photos 53-58 for IR images of this area.

THERMAL SCANNING



Photo 31: Core #4 was approximately 4 ½ inches in depth. Note the core location shows no evidence of moisture. Core samples #3 and #4 were approximately 19 feet apart. This indicates a slope of approximately 1 inch within 20 feet.



Photo 32: IR image of Core #3 showing thermal anomalies consistent with findings at time of the core sample.



Photo 59: IR image at transition to the center area of the roof looking south along the parapet wall. The wall is showing high temperatures. While thermal anomalies are present, portions of the anomaly could be a result of reflectivity of the wall on the roof.

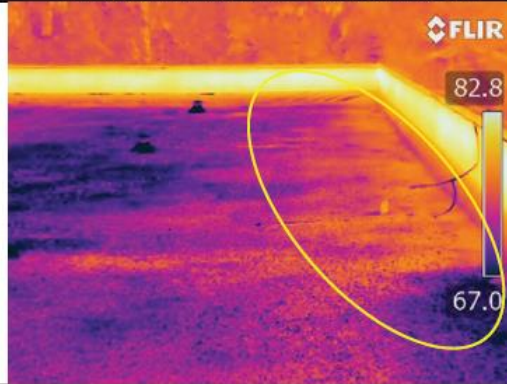


Photo 60: IR image of center transition of the roof north of the courtyard. This image is looking north along the east parapet.

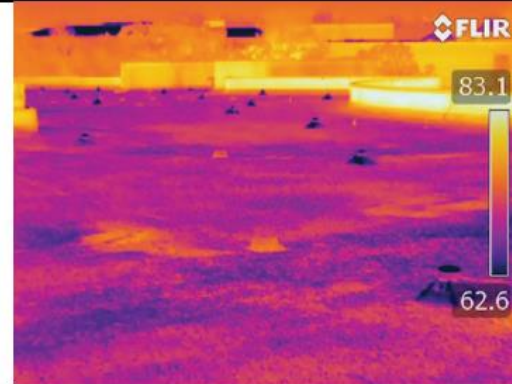


Photo 61: Various thermal anomalies throughout the roof area looking west along the center section of the roof area.

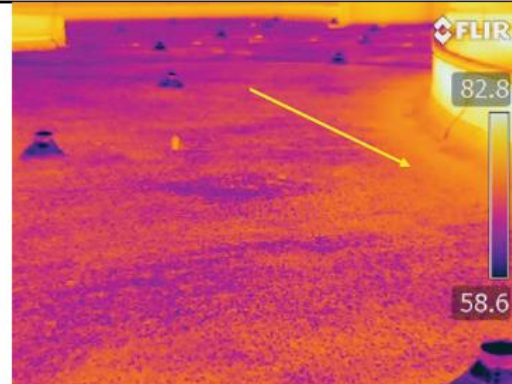


Photo 62: Visible anomalies along the north section of the center roof area.

WATER TESTING



Photo 3: Approximately 1 hour into the test procedure, the spray rack was moved vertically approximately 10 feet and focused on the interface of the brick veneer to the poured in place concrete.



Photo 7: Water migrating from head condition and dripping on sill as a result of the test procedure.



Photo 15: Overview photo of Test Area #3. Test Area #3 included the roof side of the parapet above Test Areas #1 & 2.



Photo 4: Approximately 3 hours into the test procedure, the spray rack was moved vertically approximately 10 feet and focused on the poured in place concrete. The vertical transition between the brick veneer and concrete was included in the test area.



Photo 8: Overview photo of Test Area #2. The spray rack was positioned approximately 5 feet above the fourth-floor line and focused on the brick veneer approximately 6 feet adjacent to Test Area #1.



Photo 16: General photo to show position of hand-held nozzle directed at parapet. See [Photo 17](#) for pressure at gauge.



GENERATING SOLUTIONS

4

GENERATING SOLUTIONS

Building Focus Areas:

- A. Balconies
- B. Roof
- C. Materials & Construction
- D. Administration Wing
- E. Atrium

Balconies

ISSUES

- 3 types of curtain-wall systems in place
- Water leaking thru balcony slabs

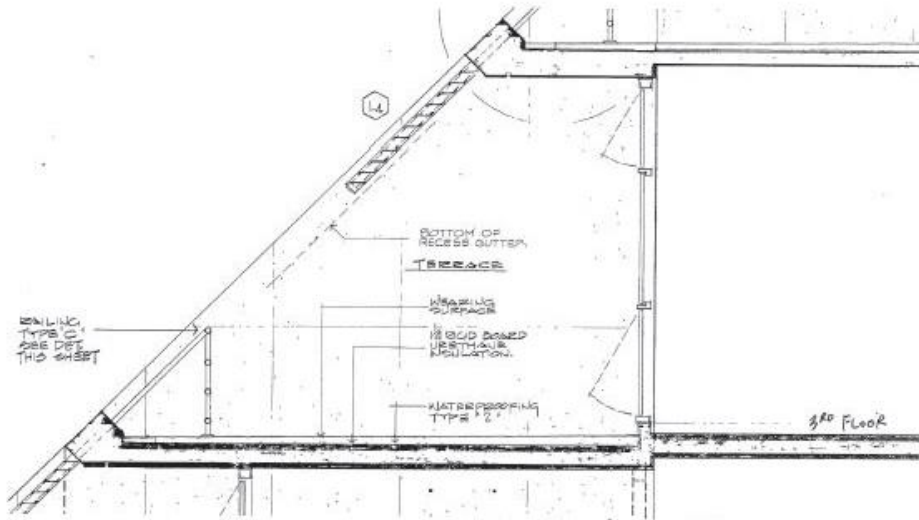
DISCOVERIES

- Significant vegetation build up
- Lack of maintenance
- Vandalism from student use

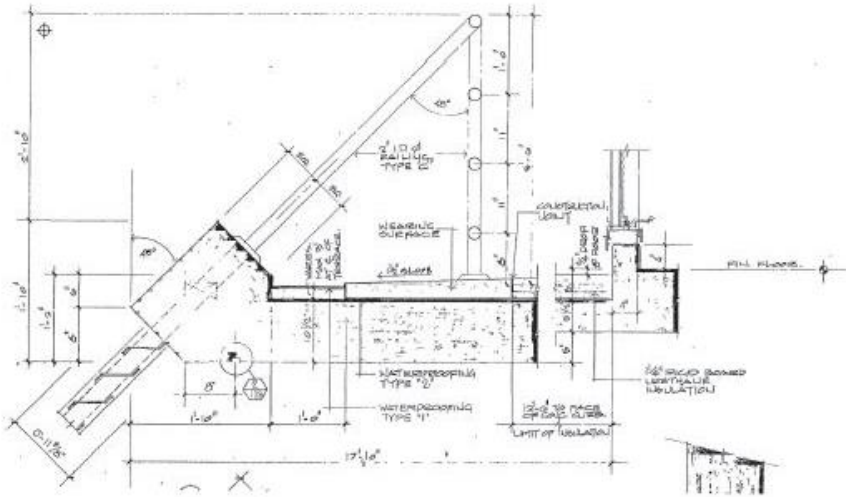
SOLUTIONS

1. Direct Repairs
 - a. Keep the existing design intent
2. Progressive Resolutions
 - a. Solar Array
 - b. Perforated Metal Panel
 - c. ETFE System
3. Transformative Solutions
 - a. Dual ETFE System
 - b. Frames
 - c. Fins

ORIGINAL DESIGN DOCUMENTS

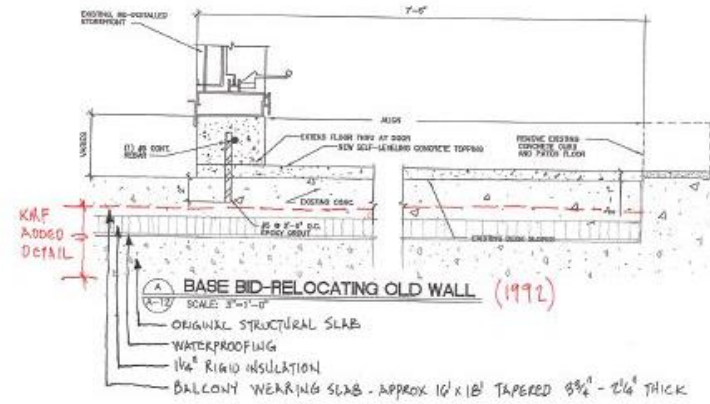


ORIGINAL CONSTRUCTION (1977)



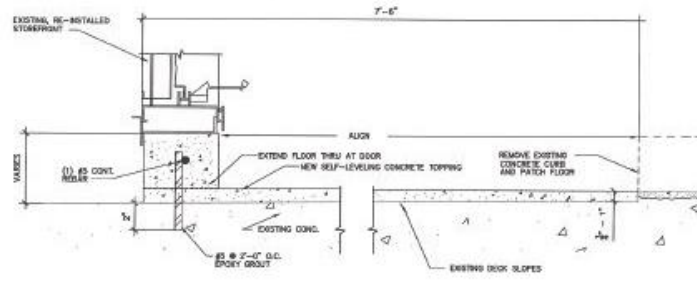
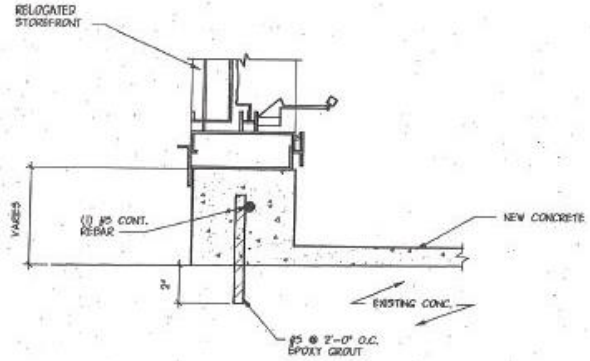
ORIGINAL CONSTRUCTION (1977)

ALTERATIONS 1990'S AND 2000'S



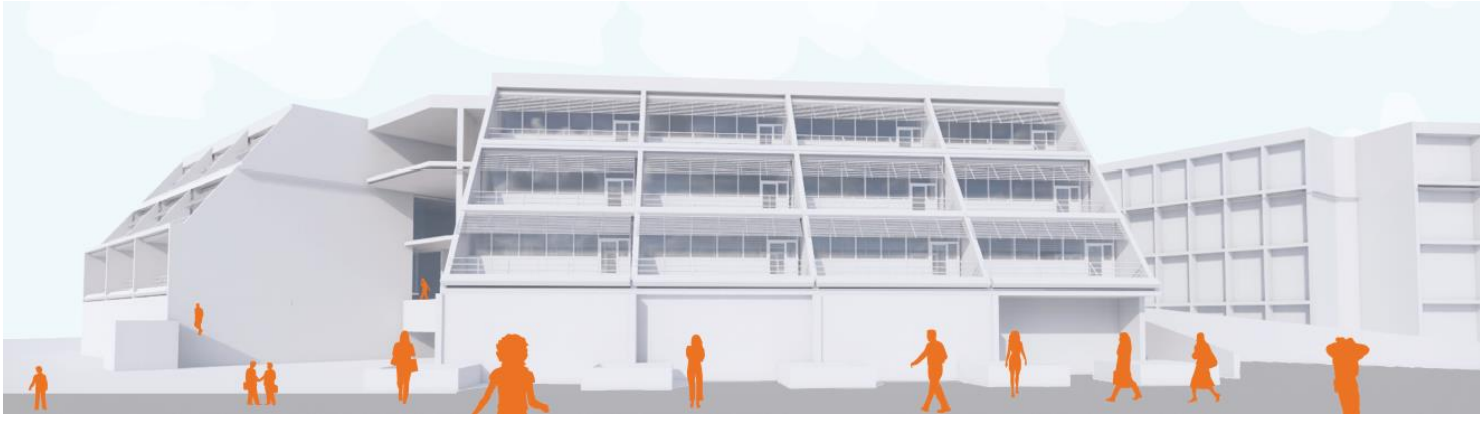
K&F
ADDED
DETAIL

- BASE BID-RELOCATING OLD WALL (1992)
- SCALE: 3/4"=1'-0"
- ORIGINAL STRUCTURAL SLAB
- WATERPROOFING
- 1/4" RIGID INSULATION
- BALCONY WEARING SLAB - APPROX 10' x 10' TAPERED 3/4" - 2 1/4" THICK

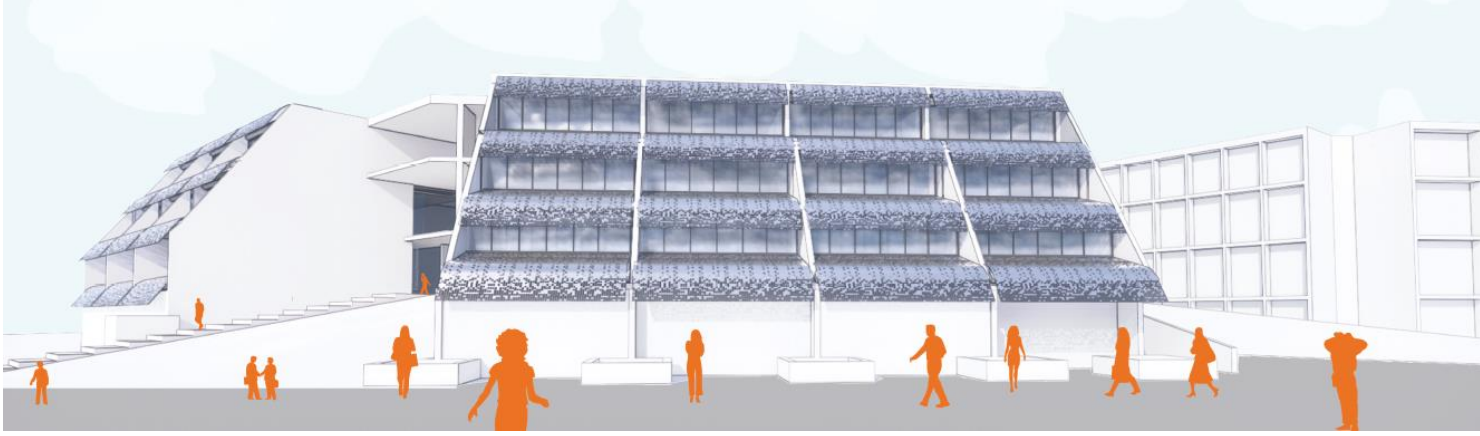


BASE BID-RELOCATING OLD WALL (2002)

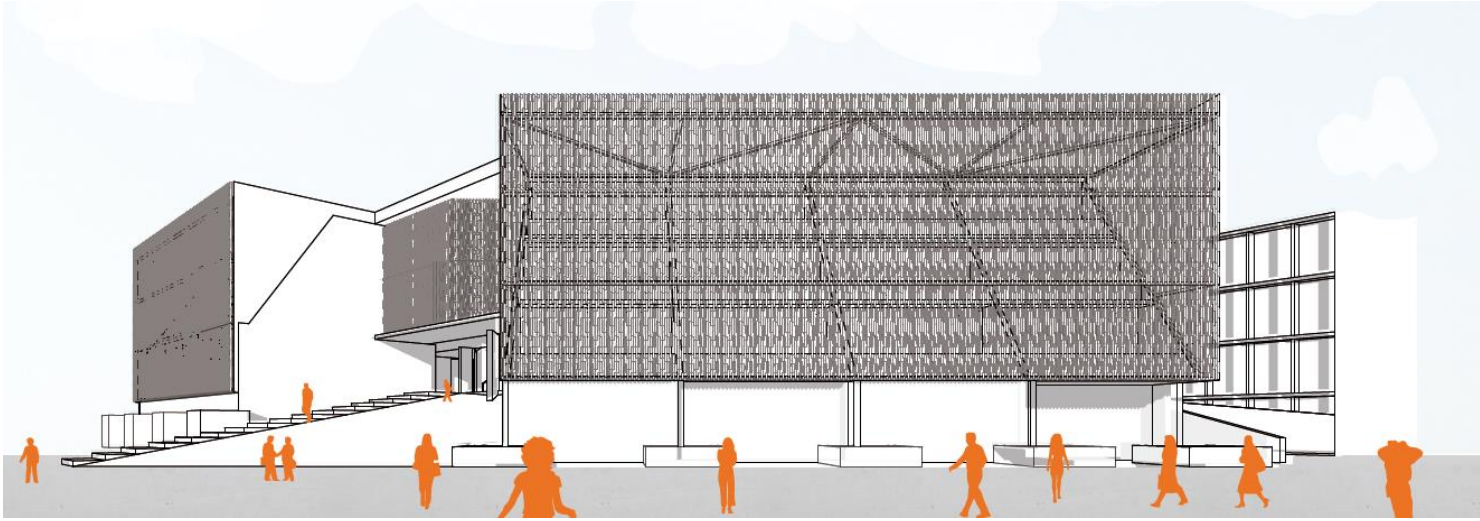
DIRECT
REPAIR

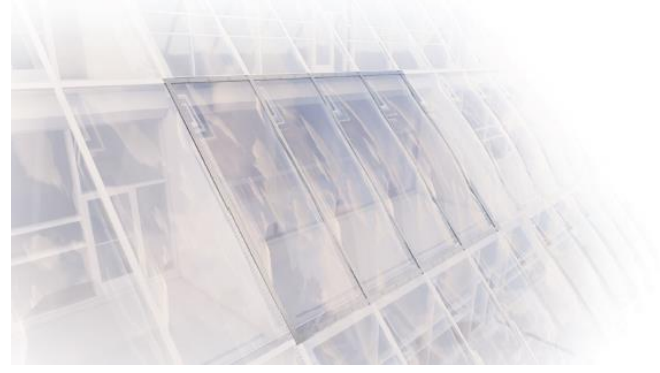
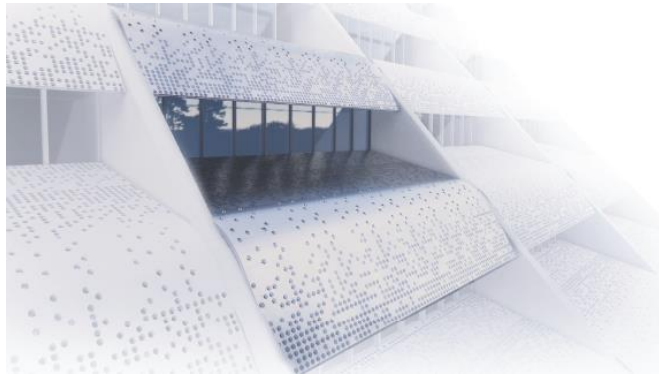
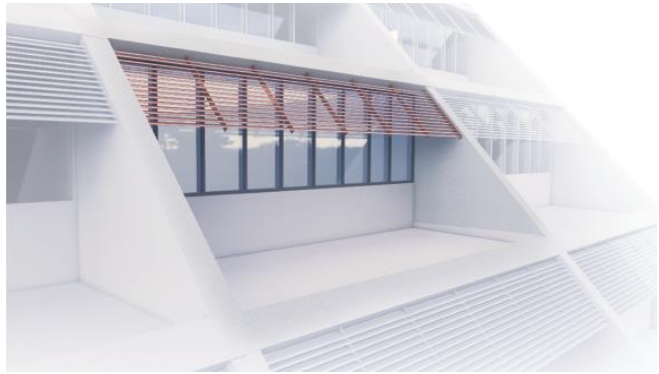
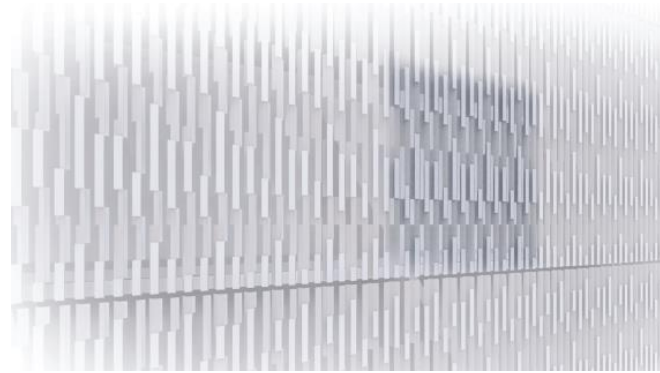
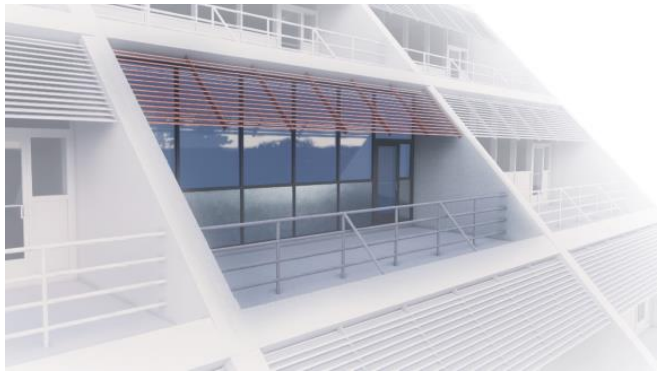


PROGRESSIVE
RESOLUTIONS



TRANSFORMATIVE
SOLUTIONS



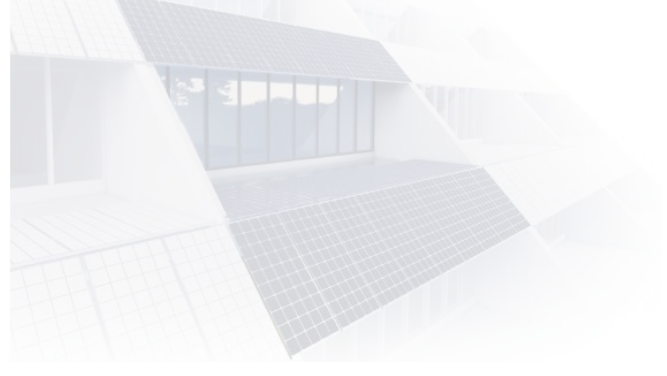
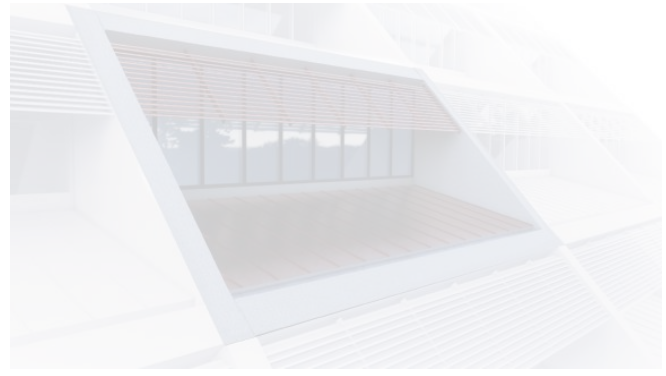
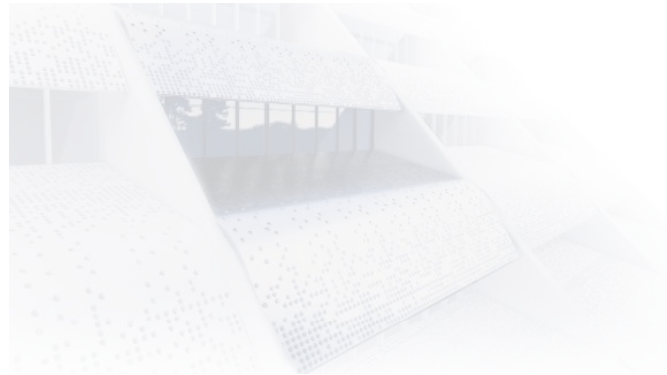
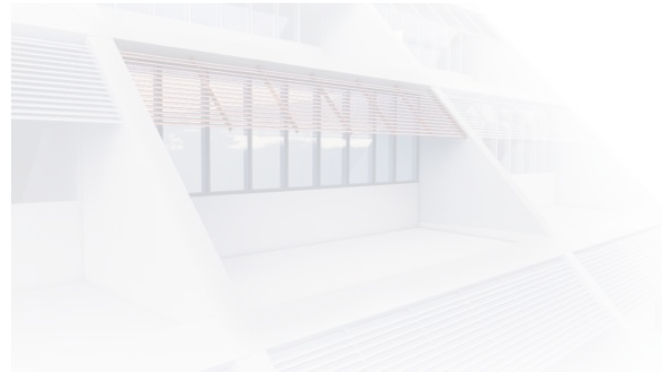
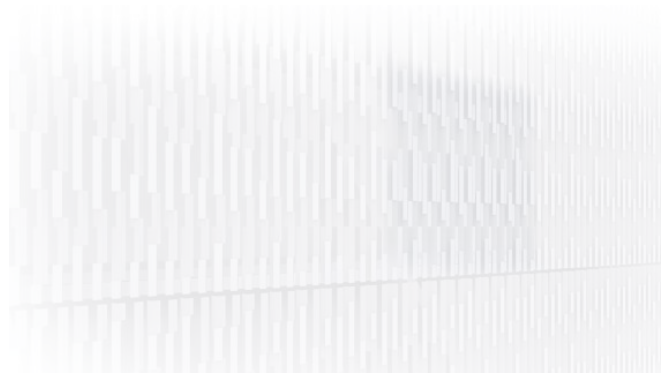
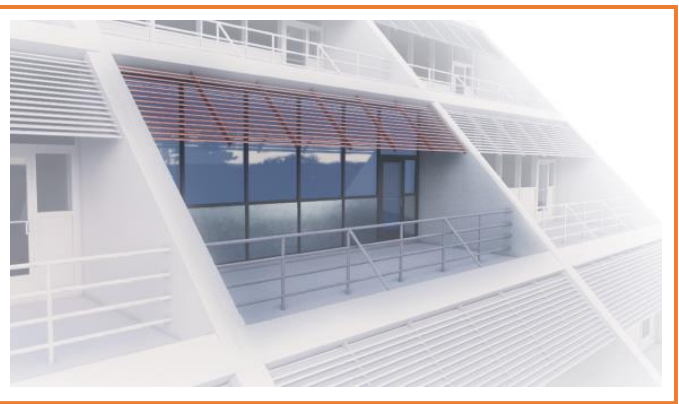


DIRECT REPAIR

PROGRESSIVE RESOLUTIONS

TRANSFORMATIVE SOLUTIONS

SOLUTIONS



DIRECT REPAIR

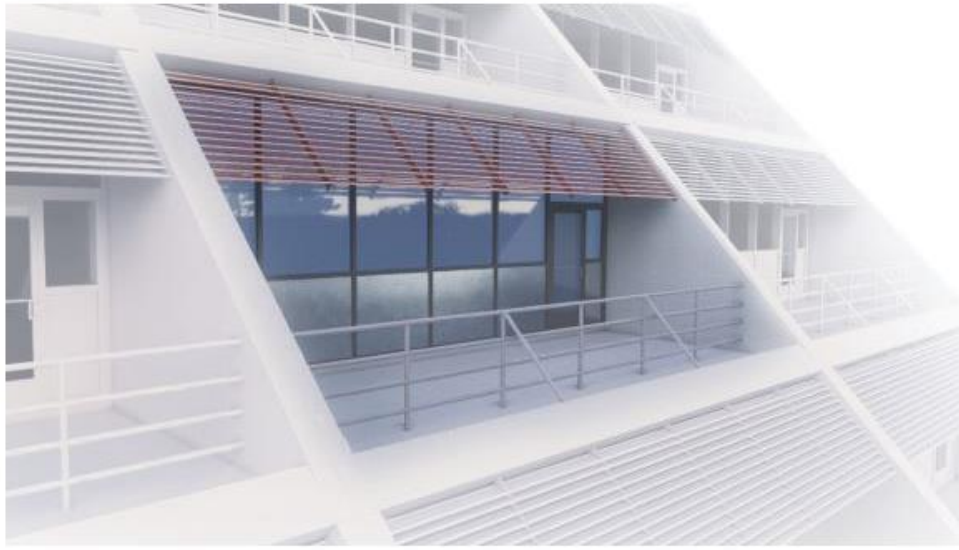
PROGRESSIVE RESOLUTIONS

TRANSFORMATIVE SOLUTIONS

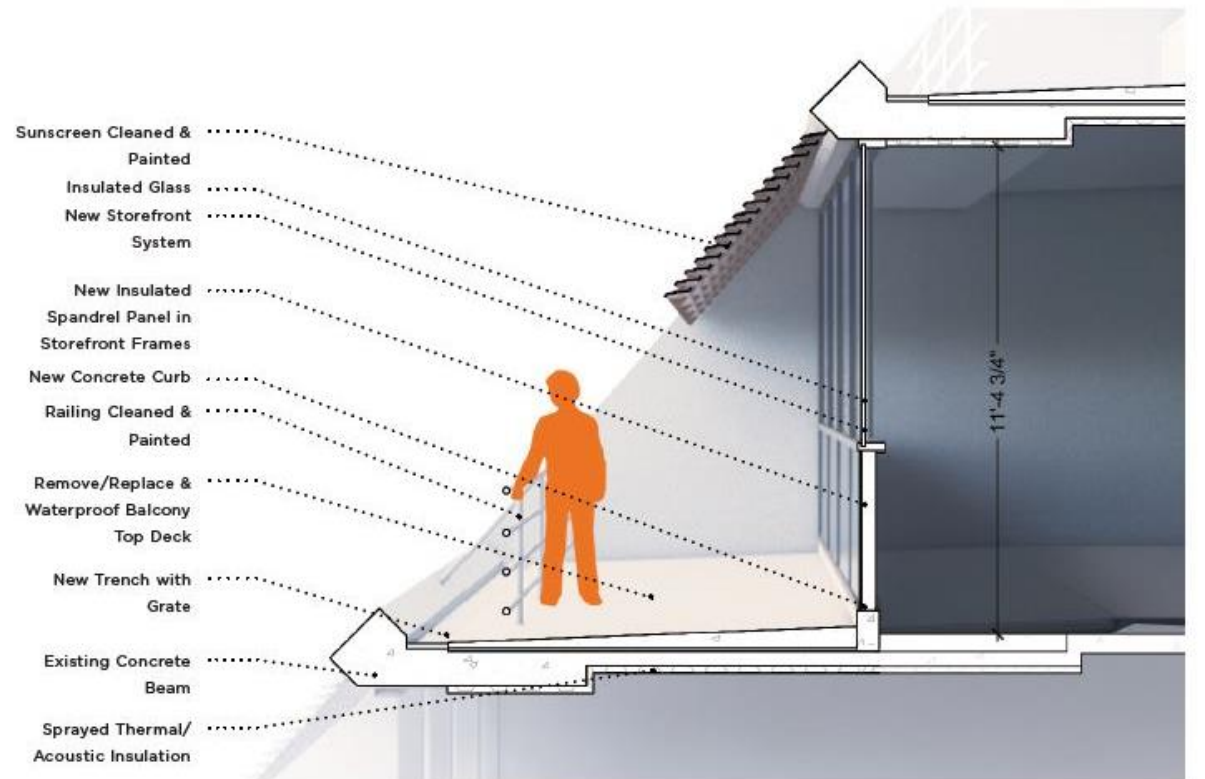
SOLUTIONS



INTERIOR VIEW



BALCONY PERSPECTIVE



BALCONY SECTION

SCALE: 3/16" = 1'



PROGRESS



904-399-1708

1480

116







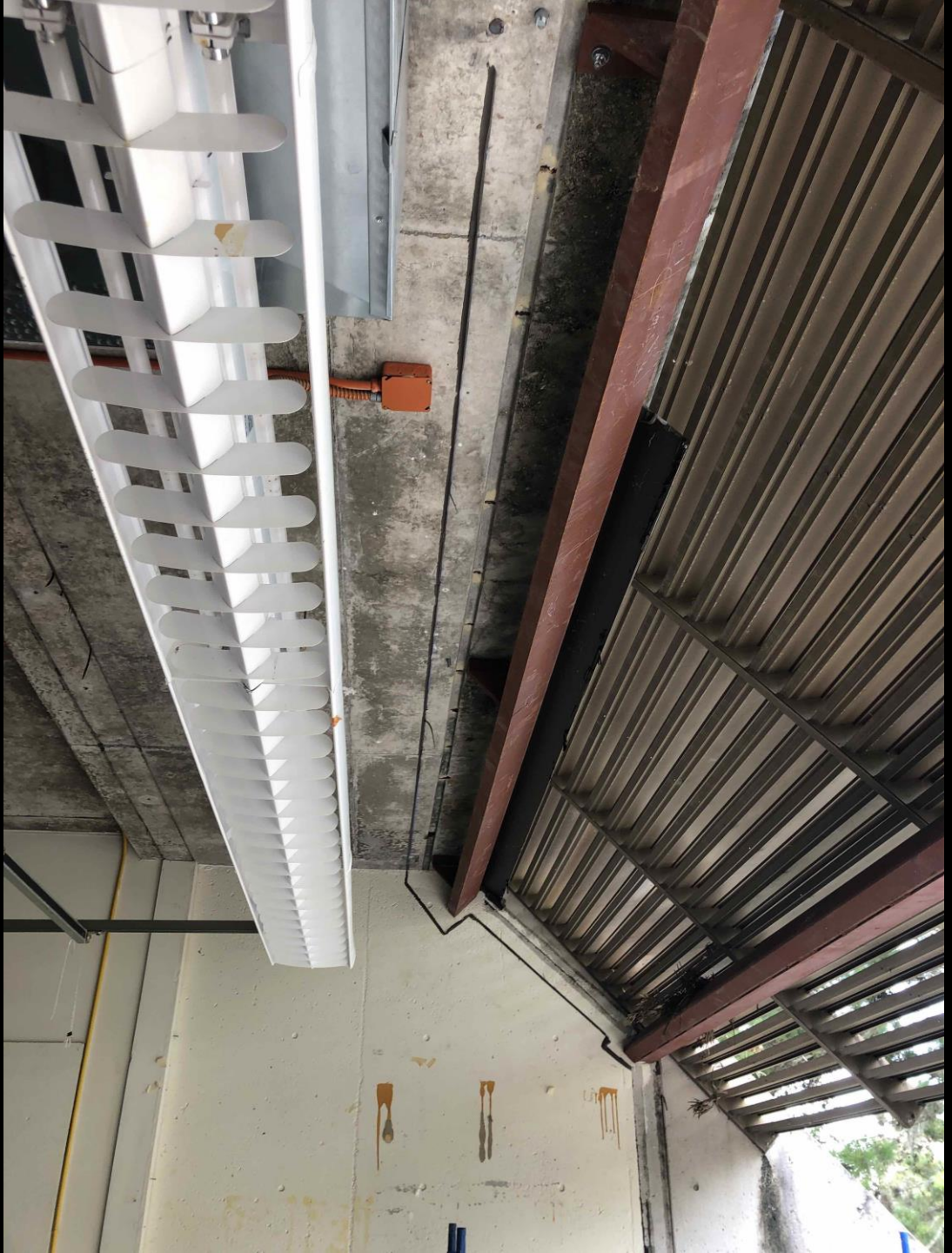


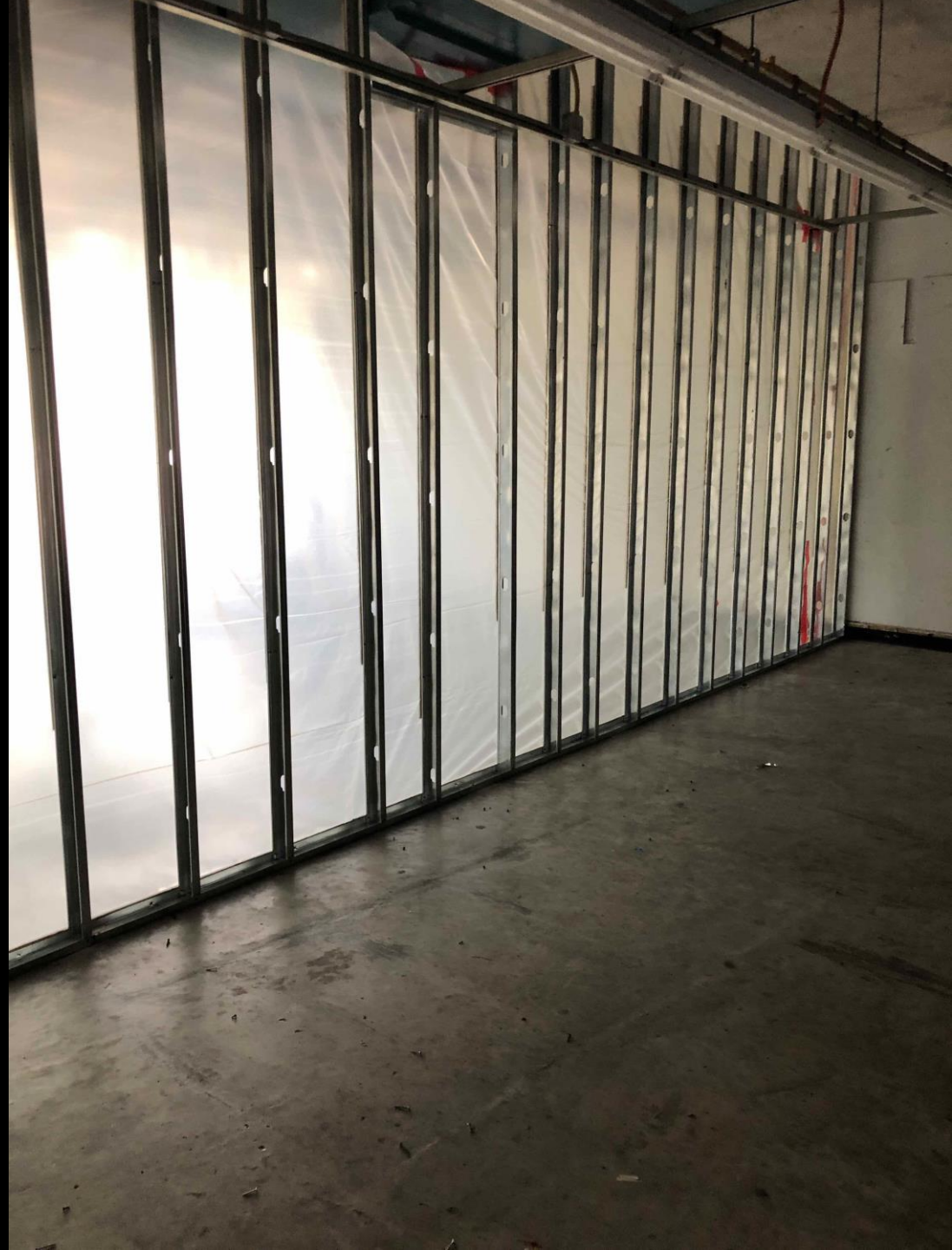














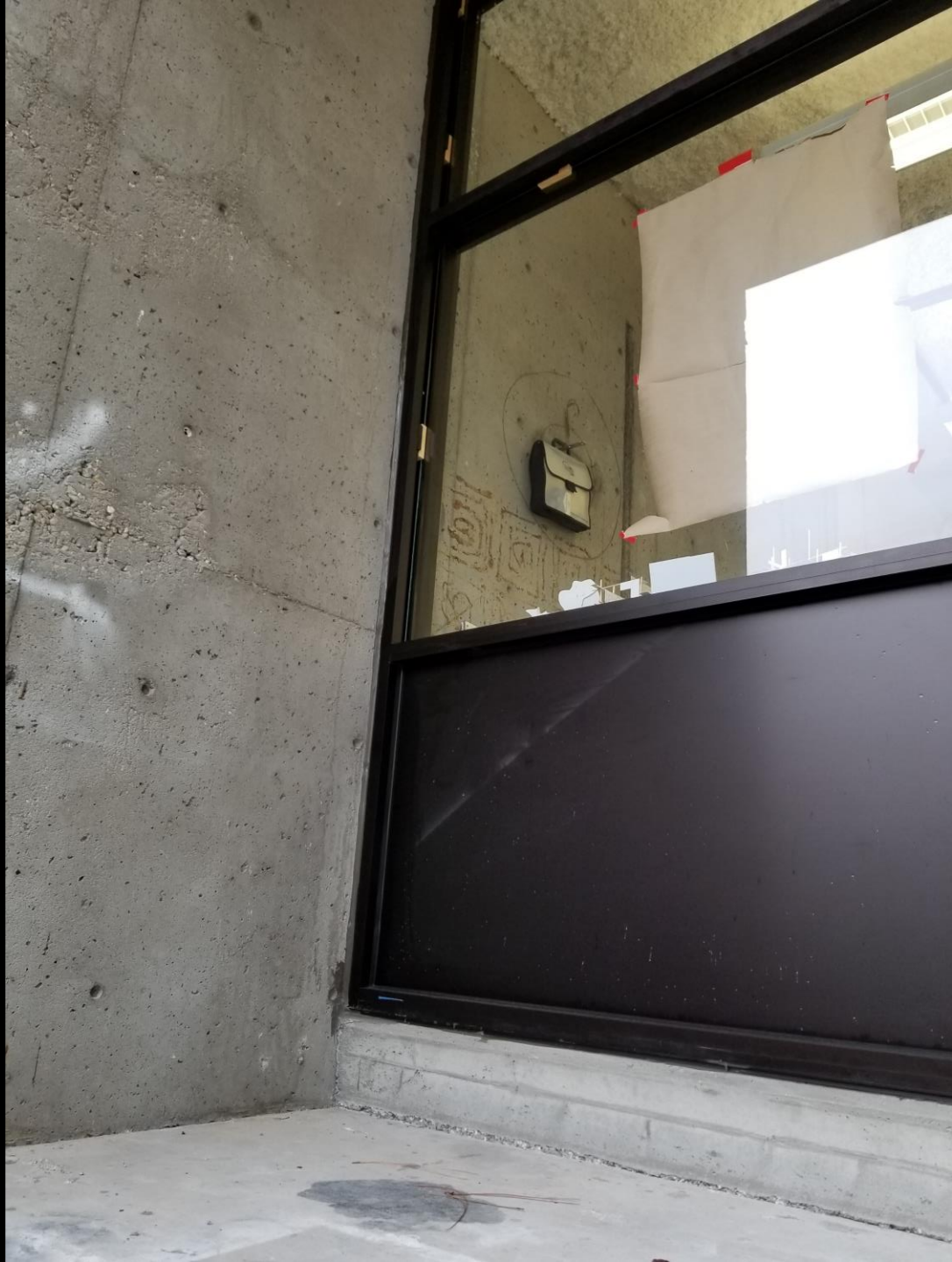
COMPLETION













480





SERVICE
VEHICLES
ONLY
TOP-WAY
STONE

Roof

ISSUES

- 40 years old and in need of replacement
- Built-up roof is nearly flat

DISCOVERIES

- Coping legs are not per SMACNA Design Standards
- Asbestos Presence in membrane and flashings
- Back of parapet facings are delaminating

SOLUTIONS

Reroof Options

1. Lightweight pour over existing roof
2. Remove existing to existing lightweight and reroof with lightweight
3. Remove to structural deck and reroof with lightweight
4. Remove existing lightweight and replace with 3 ply SBS Modified Bitumen

Roof

ISSUES

- 40 years old and in need of replacement
- Built-up roof is nearly flat

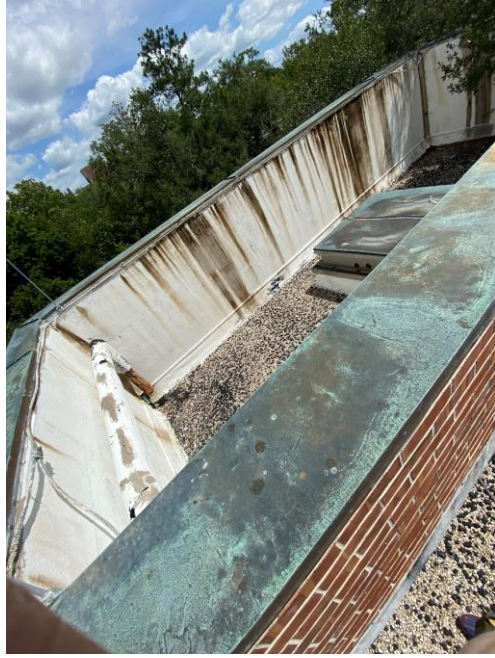
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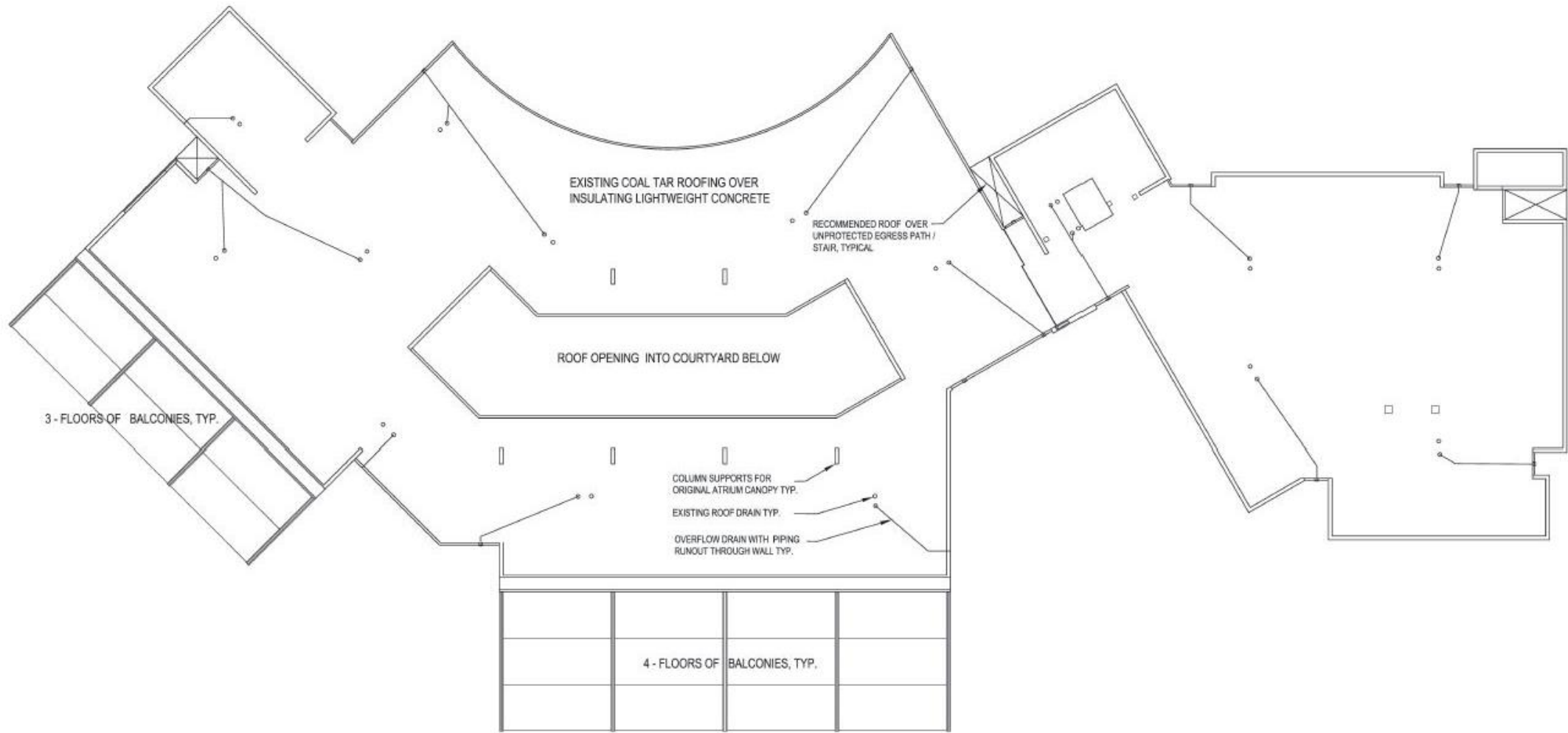
SOLUTIONS

Reroof Options

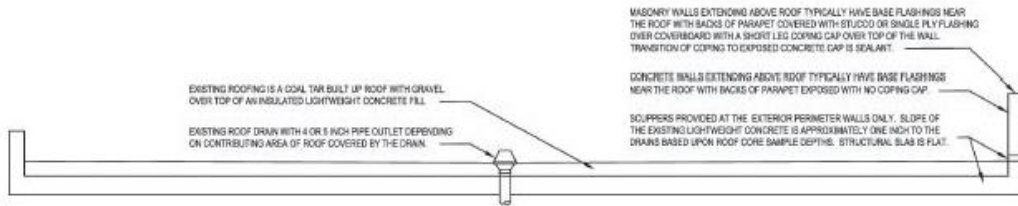
1. Lightweight pour over existing roof
2. Remove existing to existing lightweight and reroof with lightweight
3. **Remove to structural deck and reroof with lightweight**
4. Remove existing lightweight and replace with 3 ply SBS Modified Bitumen



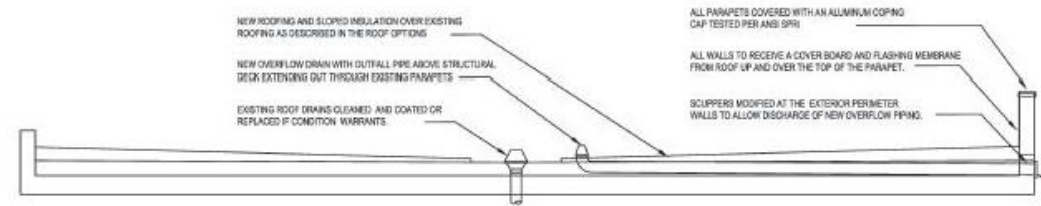
ISSUES



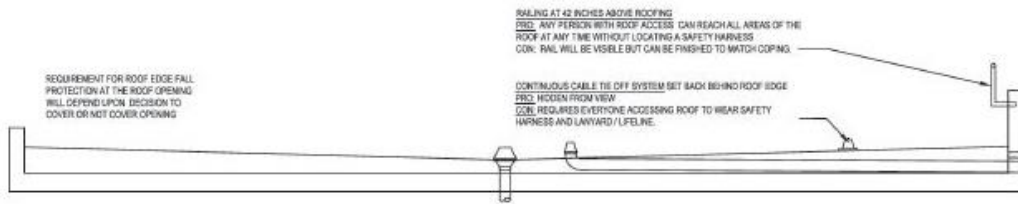
ROOF PLAN - N.T.S.



EXISTING ROOF CONSTRUCTION

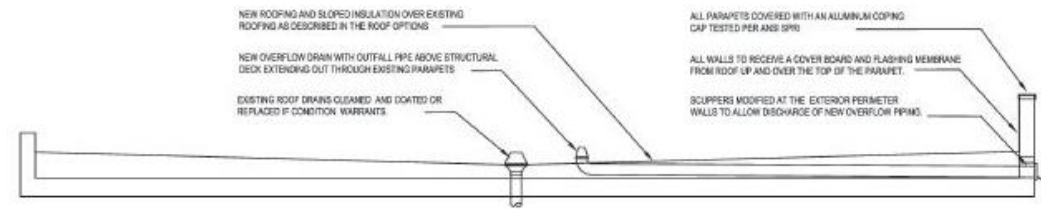


REPLACEMENT ROOF OPTIONS 1, 2, 5, AND 6


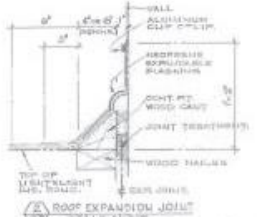
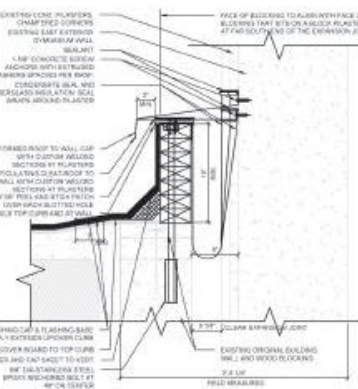

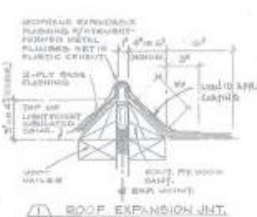
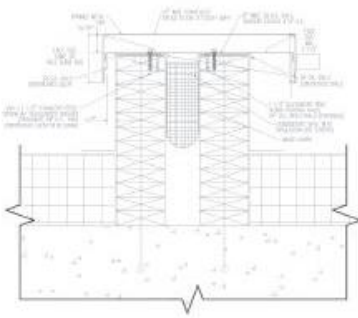


ROOF EDGE FALL PROTECTION OPTIONS

NOTE: FALL PROTECTION REQUIRED BY IFC STANDARDS



REPLACEMENT ROOF OPTIONS 3, 3B, 7, AND 7B

| PHOTOGRAPHS | REFERENCE DETAILS - (ORIGINAL DETAILS) | REPLACEMENT DETAILS | GENERAL NOTES |
|--|--|--|---|
|  <p>PHOTO RELATED TO 3R AND 3D</p> |  <p>ROOF EXPANSION JOINT SCALE 3/8"=1'-0"</p> |  <p>ROOF STRAMBUCK JOINT</p> | <p>GENERAL NOTES</p> <ol style="list-style-type: none"> A. ALL NOTATIONS ARE FOR CONSTRUCTION PURPOSES ONLY. B. ALL DIMENSIONS ARE TO FACE UNLESS NOTED OTHERWISE. C. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND CONDITIONS PRIOR TO COMMENCING WORK. ALL DIMENSIONS & NOTES SHOULD BE CHECKED IN WRITING TO THE ARCHITECT PRIOR TO PROCEEDING WITH THE WORKMAN IN LOCATION. D. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED. E. PROVIDE ALL DIMENSIONS IN CONFORMANCE WITH FLOORING CODES. F. SEE LIFE SAFETY PLAN FOR EXIT, EGRESS AND FIRE EXTINGUISHER LOCATIONS. G. ALL MATERIALS TO BE FIELD MATCHED TO EXISTING MATERIALS. H. CONTRACTOR TO REMOVE ALL WALLS AFFECTED BY DEMOLITION & EQUIPMENT REMOVAL TO MATCH THE EXISTING ADJACENT WALL SURFACE. <p>DEMOLITION FLOOR PLAN - KEY NOTE</p> <p>001: 000</p> |
|  <p>PHOTO RELATED TO 1D AND 1R</p> |  <p>ROOF EXPANSION JOINT SCALE 3/8"=1'-0"</p> |  <p>ROOF STRAMBUCK JOINT</p> | <p>NEW WORK - KEY NOTE</p> <p>000: 000</p> <p>THIS IS A SAMPLE OF KMF ARCHITECT'S ROOF SECTIONS AND DETAILS SHEET SETUP</p> <p>DEMOLITION FLOOR PLAN - KEY NOTE</p> <p>000: 000</p> |

UF 639 Architecture Building Envelope Repairs
 BID PACKAGE 1 - THE ROOF
 DANESVILLE, FL 32807
 01/27/2020

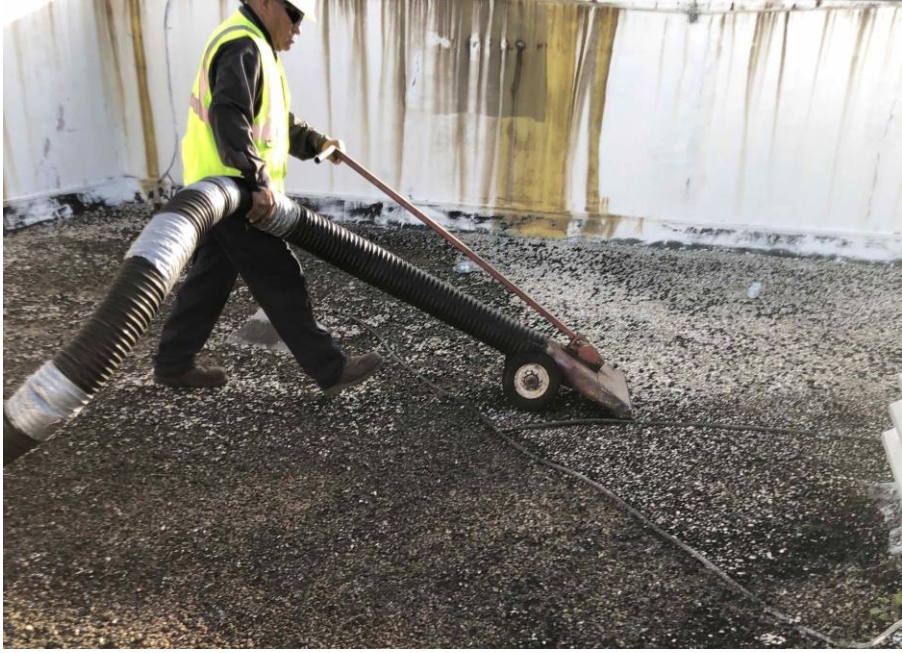


1000 UNIVERSITY DRIVE
 SUITE 100
 APOPKA, FL 32703
 407.281.1988

PROJECT # 114
 DATE 08.08.20

ROOF DETAILS
 SHEET A.114 OF 00

SOLUTIONS



PROGRESS















10/29/20 9:35 AM



10/31/20 1:08 PM



COMPLETION













Materials & Construction (IN PROGRESS)

ISSUES

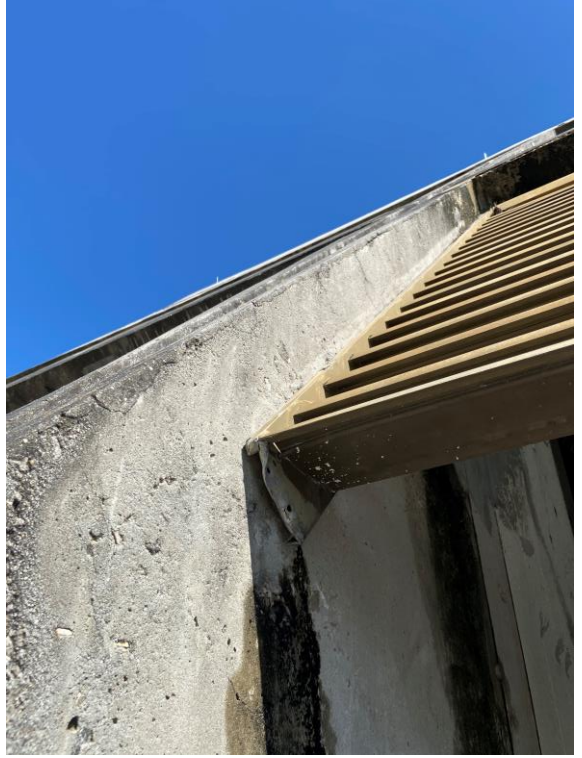
- Exposed Rebar
- Dissimilar Material Separation
- Missing Elements
- Spalling
- Improper Materials

DISCOVERIES

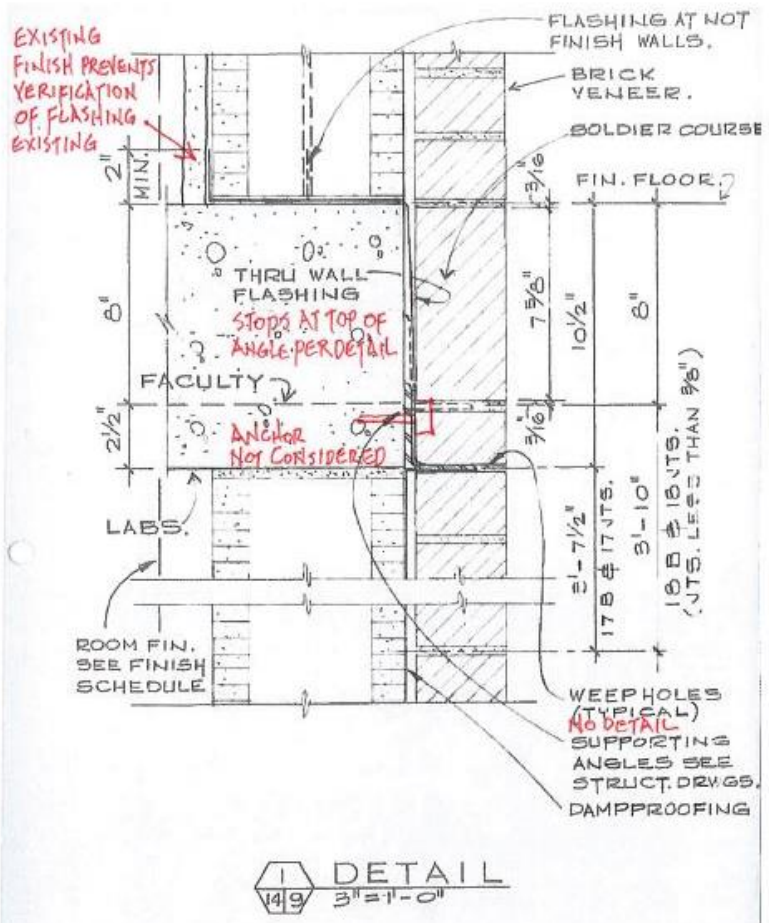
- Exposed rebar has led to additional moisture intrusion
- Brick and concrete are cracking/ separating causing moisture intrusion
- Missing ledge angles, flashing, weeps, etc. have caused differential settlement, separation of materials and the lack of the ability of the wall to expel water
- Field brick used at the head of walls

SOLUTIONS

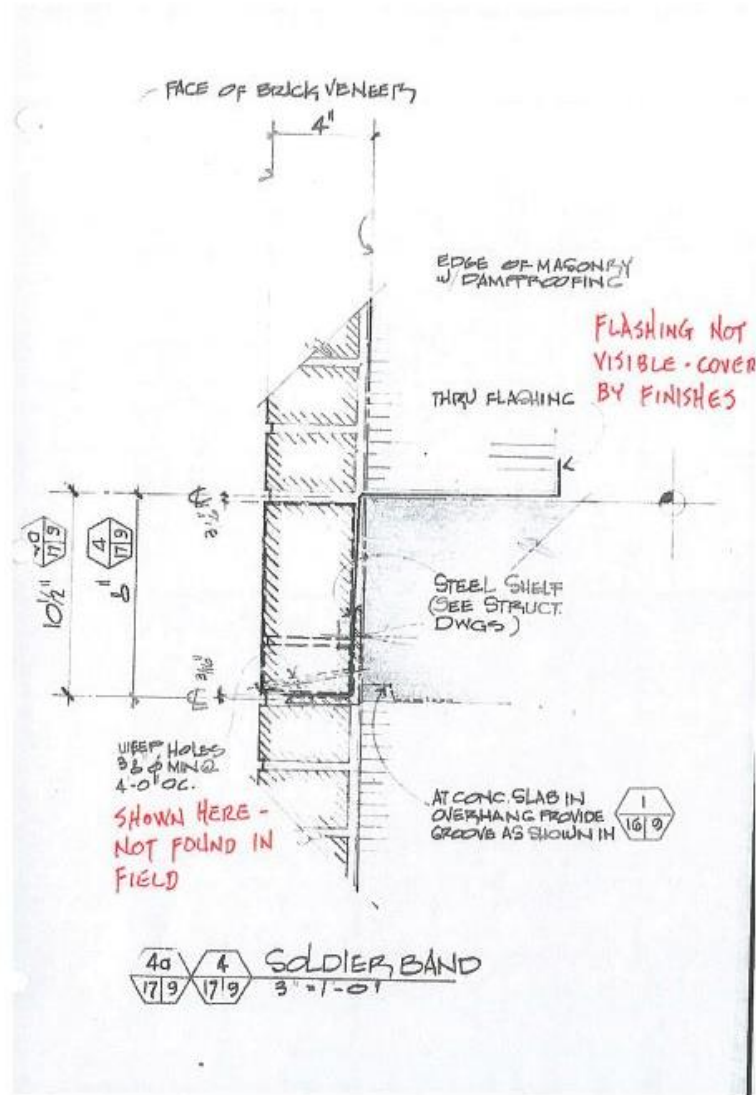
- Remove existing material from control joint, clean, and install new sealant and secondary protection
- At existing cracks, remove mortar joint and cracked bricks. Replace brick and install mortar to match
- Remove brick as necessary to install shelf angles, flashing, weeps etc. Replace brick and install mortar to match



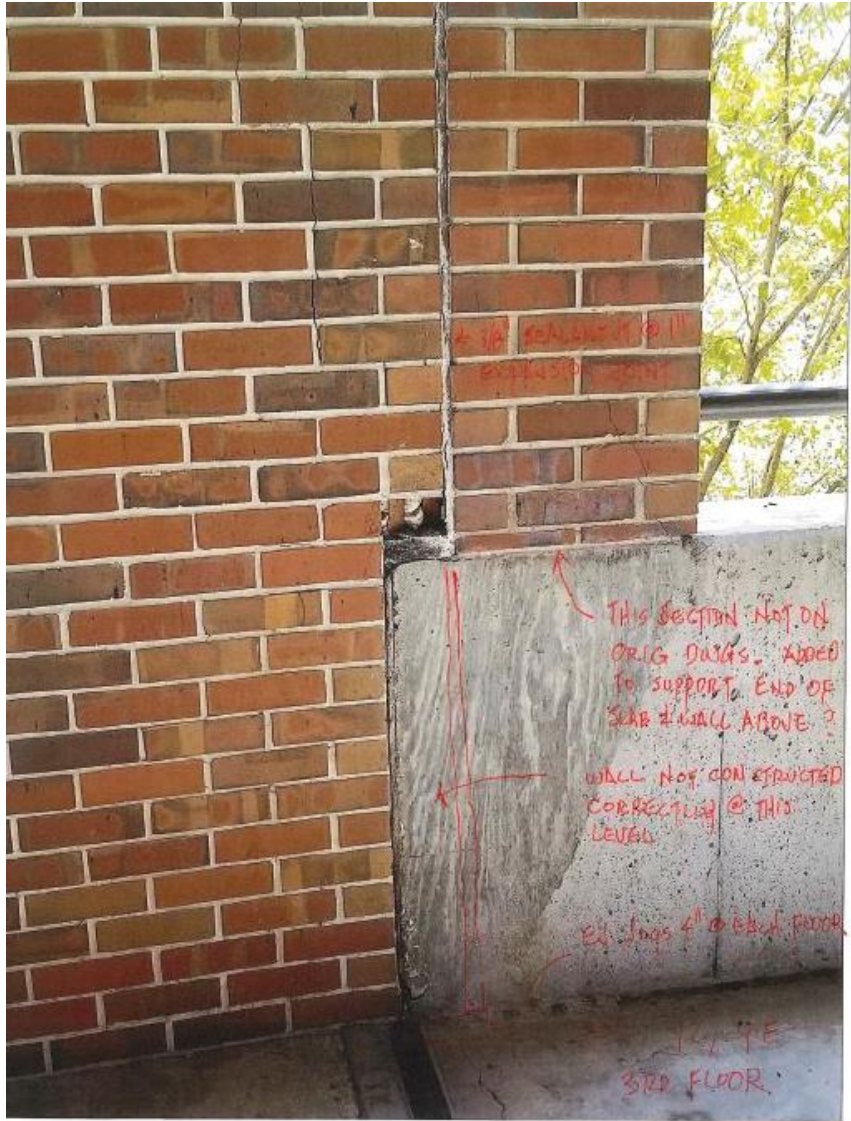
ISSUES



OBSERVATION: NO EVIDENCE OF WEEP HOLES, FLASHING EXTENDING OUT OF BRICK JOINT FOUND IN FIELD. FINISH ON INSIDE OF WALL HIDE ANY EVIDENCE THAT FLASHING EXISTS







Administrative Wing (FUTURE)

ISSUES

- Water intrusion
- Large open wall areas
- Water through doorways

DISCOVERIES

- Failing joints
- Spalling at deep inset sills
- Standing water at entry walkways

SOLUTIONS

1. Direct Repairs
2. Replacement
3. Progressive Resolution
 1. Dual ETFE System
 2. ETFE System



ISSUES

ADMINISTRATION SOLUTIONS



DIRECT REPAIR



ETFE SYSTEM



DUAL ETFE SYSTEM



SOLUTIONS

WALKWAY SOLUTIONS



LOUVERS



ETFE SYSTEM



FINS





Atrium (FUTURE)

ISSUES

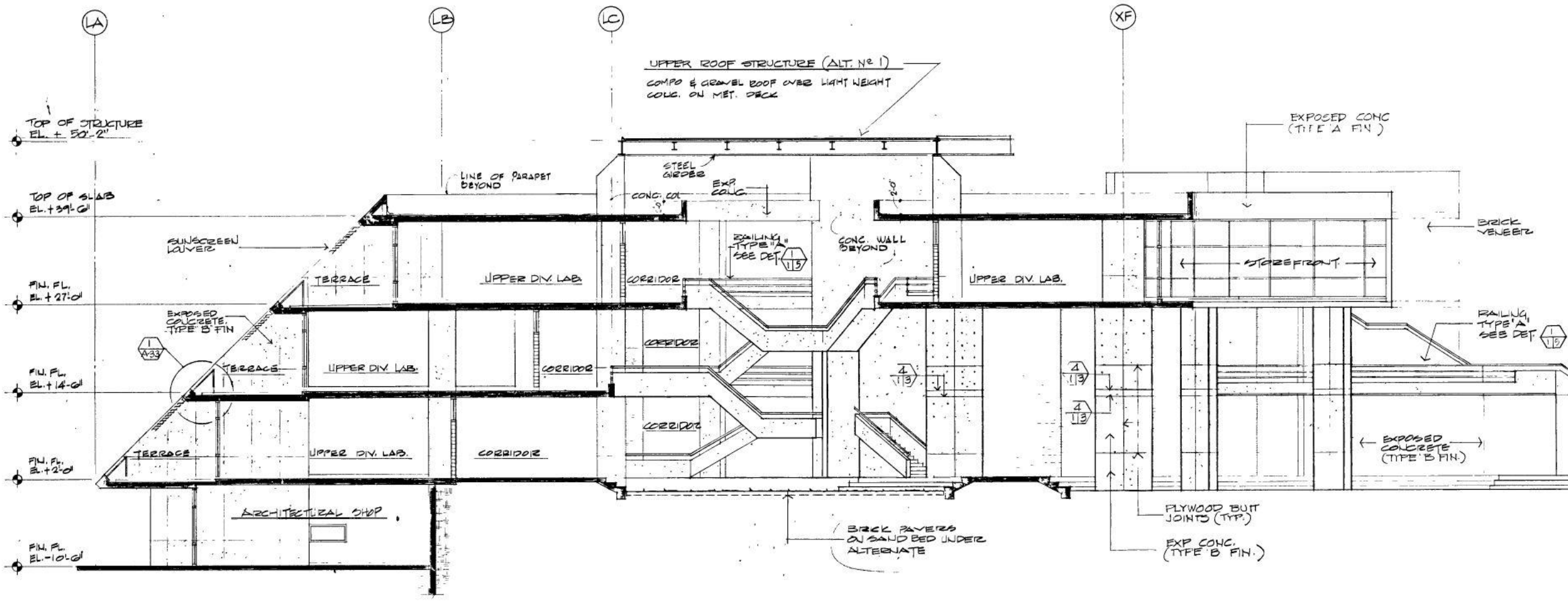
- Originally designed with a solid roof
 - Removed during VE
 - No other design changes were considered

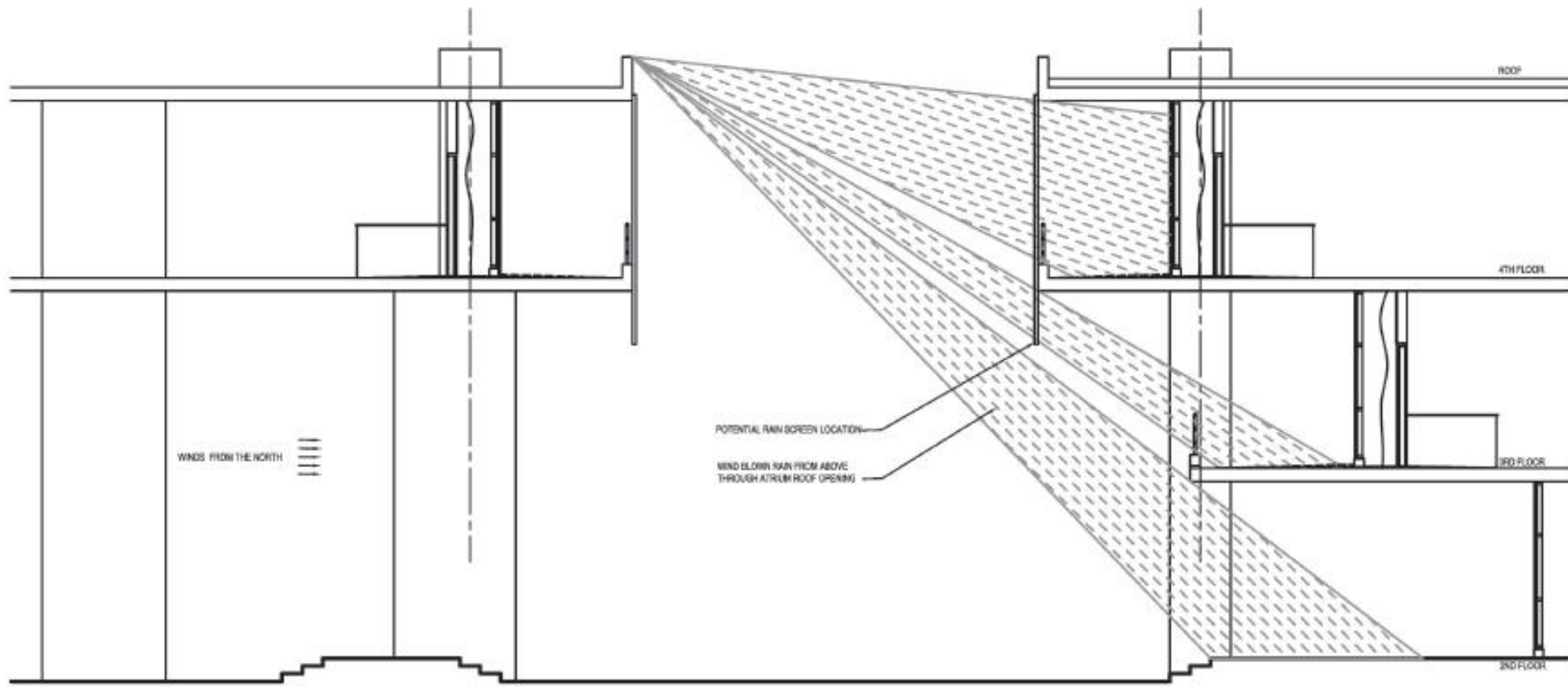
DISCOVERIES

- Walkways are not properly sloped
- Walkways are not properly drained
- Waterproofing was not used on walkways
- Alterations to interior curtain-walls were not properly detailed

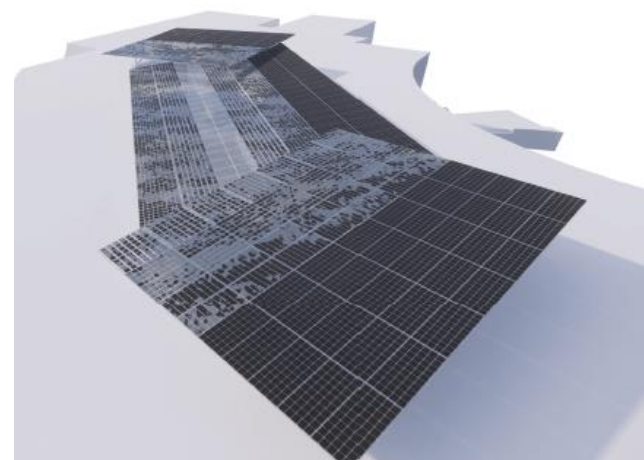
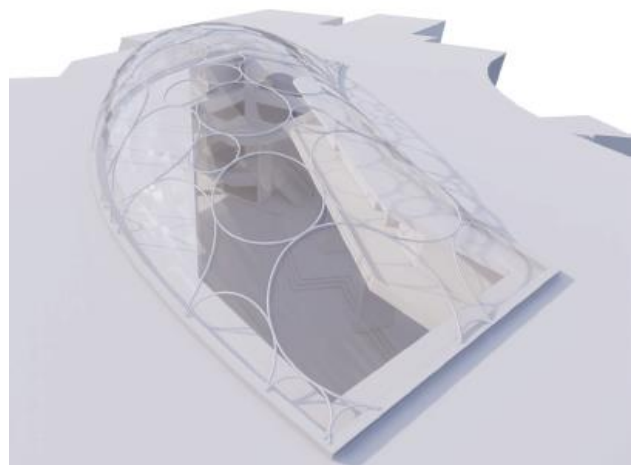
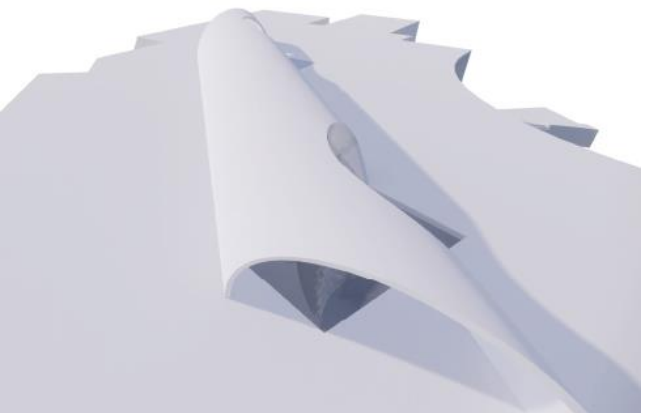
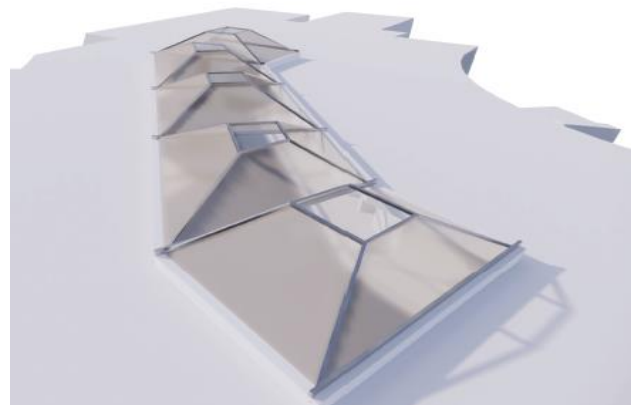
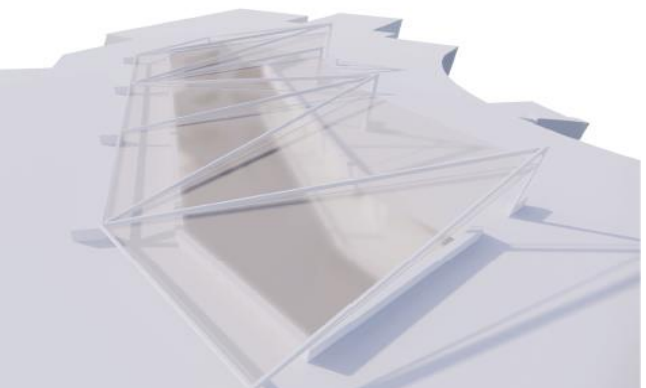
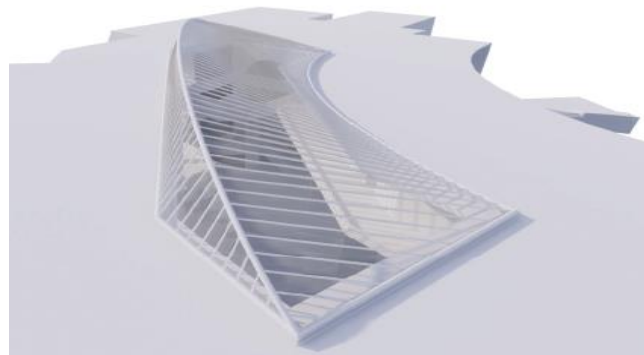
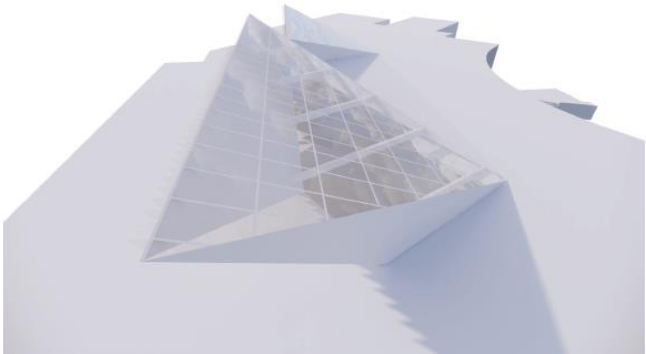
SOLUTIONS

1. Rework interior walkways
 - a. Slope existing walkways
 - b. Add curb below curtainwall
2. Provide Atrium Roof
 - a. Skylight Systems
 - b. ETFE Systems
 - c. Solar Systems





WIND DRIVEN RAIN EXPOSURE
N.T.S

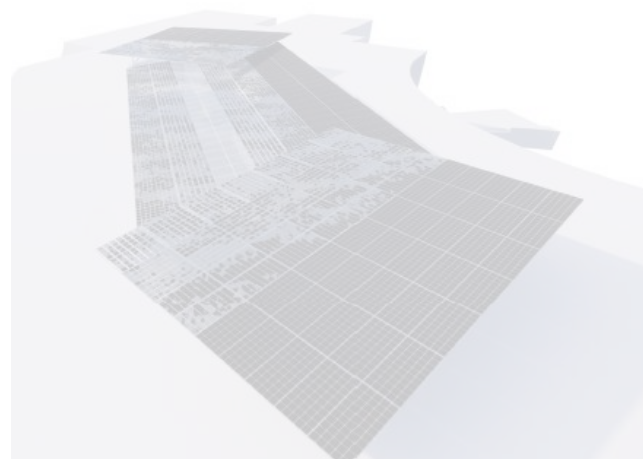
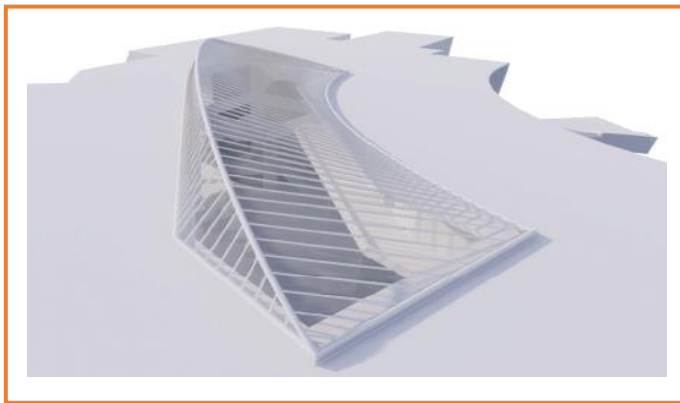


SKYLIGHT SOLUTIONS

ETFE SOLUTIONS

SOLAR SOLUTION

SOLUTIONS



SKYLIGHT SOLUTIONS

ETFE SOLUTIONS

SOLAR SOLUTION

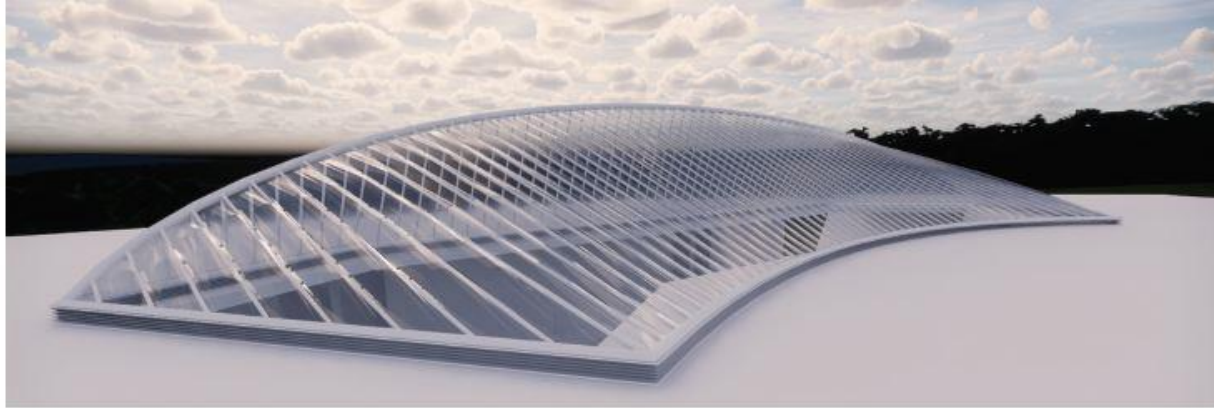


Single Layer ETFE
Aluminum Support Structure



Aluminum Support Structure

Dual Layer ETFE



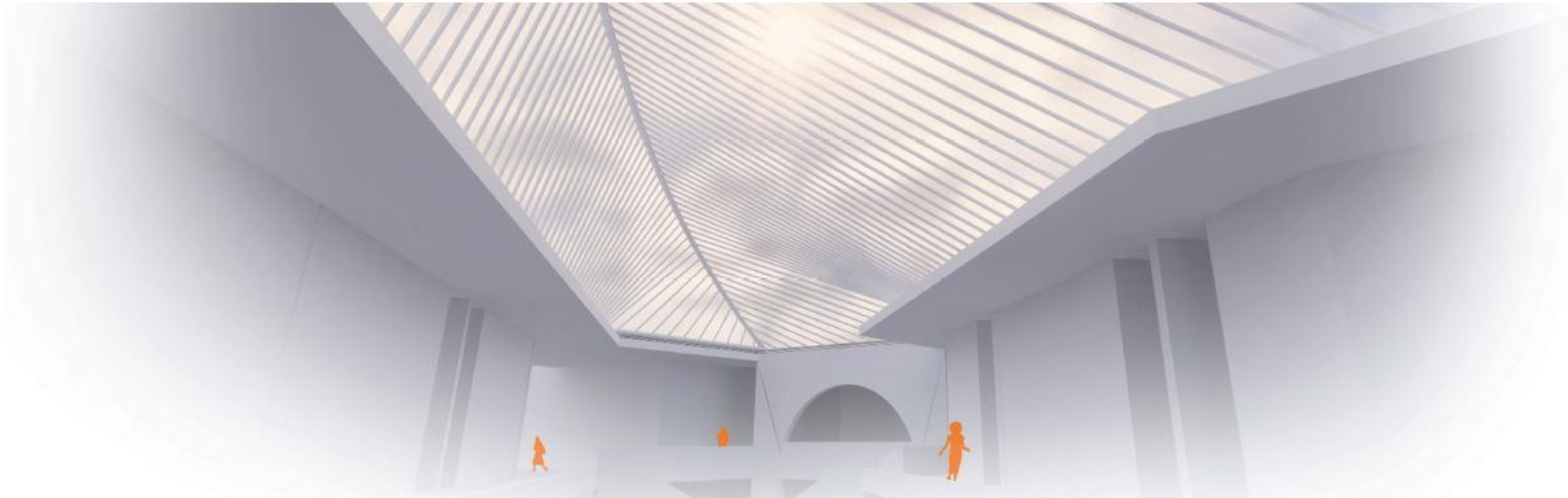
ROOF PERSPECTIVE

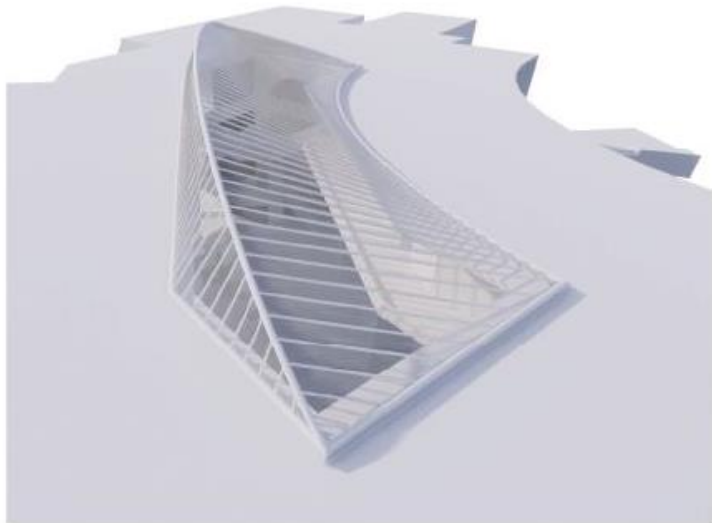
PROS

- Delicate structure allows clear view of the sky
- Water is kept off interior walkways and stairs
- No Demo is required for interior walkways
- System can be made primarily off site
- The system is easily maintained
- Light
- Graceful
- Has an R value

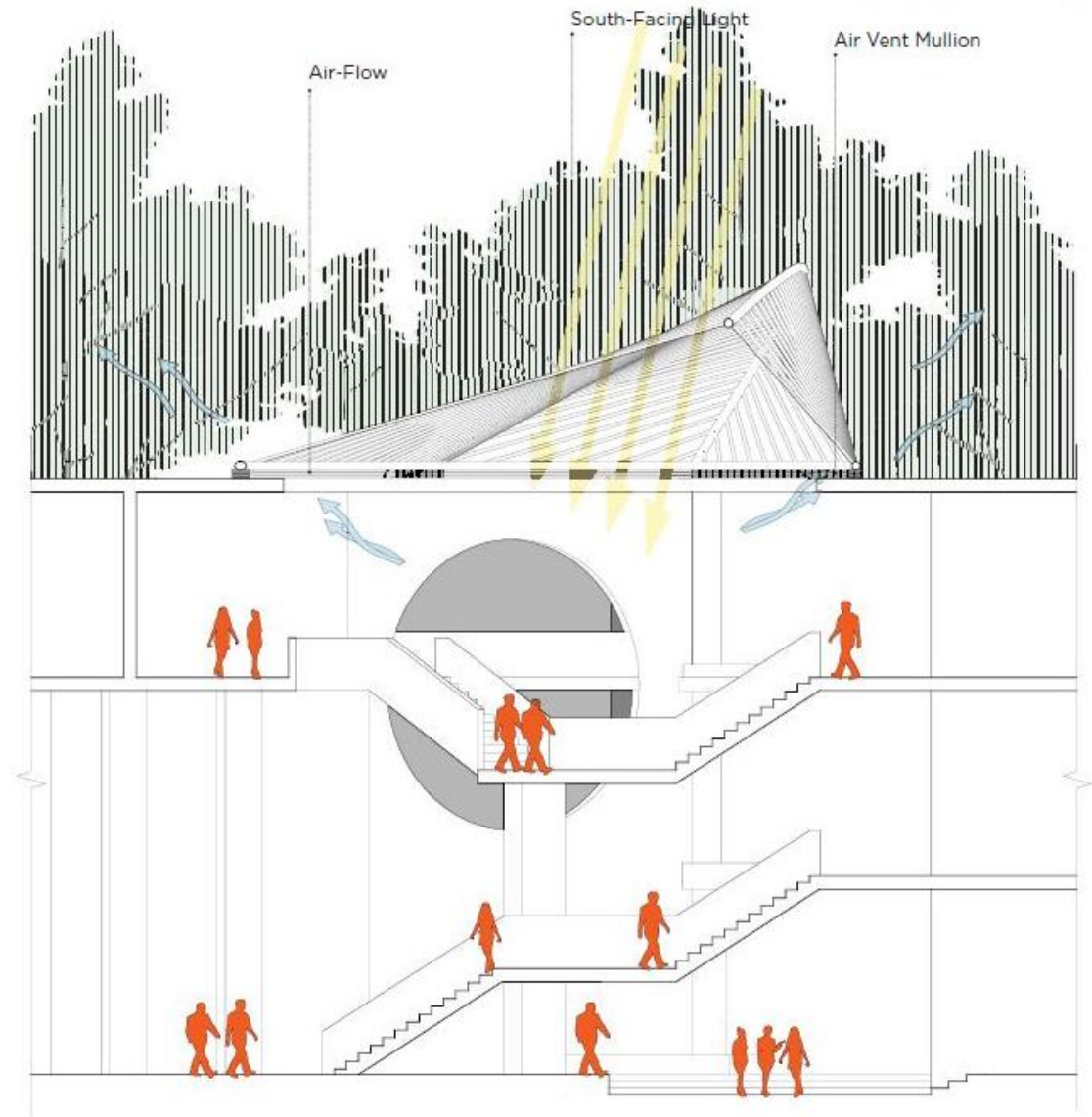
CONS

- Small Motor Maintenance





ROOF PERSPECTIVE



ATRIUM SECTION







QUESTIONS

