Leakage Investigation

John W. McCormack Building - One Ashburton Place
Boston, MA
31 December 2012

SGH Project 100777

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures

PREPARED FOR:

Kevin T. Jensen, P.E.
Vice President
AHA Consulting Engineers
24 Hartwell Ave, 3rd Floor
Lexington, MA 02421

PREPARED BY:

Simpson Gumpertz & Heger Inc.
41 Seyon Street
Building 1, Suite 500
Waltham, MA 02453
Tel: 781.907.9000
Fax: 781.907.9009

SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures

31 December 2012

Kevin T. Jensen, P.E.
Vice President
AHA Consulting Engineers
24 Hartwell Ave, 3rd Floor
Lexington, MA 02421

Project 100777 – Leakage Investigation, John W. McCormack Building, One Ashburton Place, Boston, MA

Dear Mr. Jensen:

In September 2010, Simpson Gumpertz & Heger Inc. performed on investigation into the leakage reported by the Commonwealth of Massachusetts Bureau of State Office Buildings at the John. W. McCormack Building. We returned in March 2011 to review some additional areas of concern. The attached report presents background information, a summary of our findings, and our conclusions and recommendations related to the leakage investigation and follow-up visit.

Please let us know if we can be of further assistance on this project.

Sincerely yours,

Susan L. Knack-Brown
Associate Principal

John N. Karras
Staff II – Building Technology

Rebecca H Priebe

Rebecca H. Priebe
Staff II – Structures
I:\BOS\Projects\2010\100777.00-MCMK\WP\003SLKnack-Brown-L-100777.00.ptl.docx

Encls.

SIMPSON GUMPERTZ & HEGER INC.
41 Seyon Street, Building 1, Suite 500
Waltham, Massachusetts 02453
main: 781.907.9000 fax: 781.907.9009
www.sgh.com

Boston
Los Angeles
New York
San Francisco
Washington, DC

EXECUTIVE SUMMARY

The John W. McCormack Building (McCormack Building) is a twenty-two-story office building, constructed in 1975 and operated by the Commonwealth of Massachusetts Bureau of State Office Buildings (BSB). Exterior walls consist of exposed-aggregate precast concrete panels and glazed curtain walls. The main roof and twenty-second-floor balcony roofs consist of EPDM roofing systems. At lower levels, there are smaller roofs and plazas, most of which were out of the scope of this project except for the copper first-floor elevator lobby roof and the plaza over the southeast basement offices.

Water leakage through the exterior walls has caused damage to interior finishes on multiple floors and elevations. Leakage does not always occur during heavy rain events; wind direction and speed reportedly affects the wall performance.

Simpson Gumpertz & Heger Inc. (SGH) completed an investigation that included visual observations, water testing, and small exploratory openings. Our general observations are as follows:

- A significant source of water infiltration and cause of damage to interior finishes at the McCormack Building is open joints in the precast concrete panel system's stainless steel window washing track liners. The top termination of the stainless steel track is exposed and allows water behind, many adjacent track sections are misaligned resulting in openings at the joints, and the exposed compressible filler between the precast concrete panels is not a watertight material.

- Sealant joints within the precast system are deteriorated and are a likely source of water entry. Our testing found that water enters the vertical sealant joint at the interface between the precast concrete panels and the curtain wall jamb.

- The curtain wall system, based on the systemic staining we observed, has likely experienced significant water leakage during its service life. We did not reproduce any in the field of the curtain wall during our testing, which is likely due to the recent repairs that wet-sealed the curtain wall glazing joints. We produced leakage through the curtain wall jamb expansion butt-joints, which have poor sealant geometry.

- The loose-lap and standing-seam construction of the twenty-second-floor balcony parapet copings is the primary source of water leakage at this location. Water bypasses poorly constructed joints which rely on laps and surface seals. The end terminations are also vulnerable. The balcony EPDM roofs are aged but functioning.

- The various batten-seam and flat-seam copper roof components that comprise the first-floor elevator lobby roof are deteriorated to the extent that they, or the transitions between them, likely permit water penetration through the copper cladding.

- At the southeast plaza, we could not observe the existence or condition of the buried waterproofing. Based on our limited observations, the active leakage we observed into the ceiling cavity likely originates from the plaza above. Exploratory openings are required to determine the appropriate repairs.

Based on our investigation findings, below are our recommended repair options for addressing the leakage associated with various building components.

Precast Concrete Panel System (PCPS)

- PCPS Option 1: This is the least costly and least invasive of the options and includes the following components:

    - Install preformed silicone sheet flashing seals at all joints in the precast concrete panel window washing track liners. Estimated cost is $43,000. A more durable and reliable option would be to cover the entire liner with brake-formed sheet metal that is terminated in reglets on the face of the precast panels. Estimated cost is $368,000. Either option requires covering the top termination of the window washing track with flashing.
    - Remove and replace all horizontal and vertical sealant joints between precast concrete panels and at the precast and curtain wall intersection. Estimated cost is $375,000. A more durable and reliable option would be to replace these sealant joints with double sealant joints. Estimated cost is $625,000.

- PCPS Option 2: Option 2 includes the installation of a waterproofing membrane over the existing precast concrete panels and covering the membrane with continuous insulation and a new wall cladding. This option addresses all leakage paths through the wall system, provides redundancy with the waterproofing system, and upgrades the thermal performance of the wall system. PCPS Option 2 is significantly more costly, invasive, and difficult to construct than PCPS Option 1. This option may also trigger other mandatory upgrades under Chapter 34 of the Massachusetts State Building Code Eighth Edition. A full analysis of the structural capacity of the existing cladding needs to be performed to determine the feasibility of this option. This option should be done concurrently with CWS Option 2. Because of the significant variables with this option, we did not estimate a cost.

Curtain Wall System (CWS)

- CWS Option 1: Cover all existing curtain wall jambs and vertical mullion butt-joints with pre-formed silicone sheet flashings. Replace wet seals where they have failed. This option requires maintenance to be reliable. We have not included a cost estimate for this option as costs are primarily access.

- CWS Option 2: Remove and replace the curtain wall system with a modern, compartmentalized system with insulating glass units. This option is a long-term, durable solution that also improves the energy performance. Estimated cost is $40,000,000

Twenty-Second-Floor Balcony Estimates

- Remove and replace the balcony parapet copings with fully riveted and soldered watertight copper copings. Estimated cost is $45,000.

- Replace the balcony EPDM roofs in kind. Estimated cost is $55,000.

First-Floor Elevator Lobby Roof

- Replace existing batten-seam and flat-seam copper roofs with PVC roofing. Estimated cost is $35,000.

Access costs are not included in the costs listed below. We estimate that, for smaller repair projects, contractors will use swing staging to access the building and that access costs will be in the range of $200,000. For the full curtain wall replacement, we believe that a contractor would wish to stage the entire building, and access costs would be in the range of $5,000,000.

Table of Contents

Letter of Transmittal

EXECUTIVE SUMMARY

CONTENTS **Page**

1. BACKGROUND INFORMATION 1
   - 1.1 Building Description 1
   - 1.2 Initial Site Visit 1
   - 1.3 Existing Drawings Review 2
   - 1.4 Information from Others 2

2. FIELD OBSERVATIONS 3
   - 2.1 Interior Observations 3
     - 2.1.1 General Interior Finish Systems 3
     - 2.1.2 Interior Observations Behind Precast Concrete Panels 3
     - 2.1.3 Curtain Wall System 4
     - 2.1.4 Twenty-First-Floor Conference Room 3 4
     - 2.1.5 First-Floor Elevator Lobby 4
     - 2.1.6 Southeast Basement Office Space 5
   - 2.2 Exterior Observations 5
     - 2.2.1 General Building Layout and Building Envelope Systems 5
     - 2.2.2 Precast Concrete Panels 6
     - 2.2.3 Curtain Wall System 7
     - 2.2.4 Twenty-Second-Floor Balconies 8
     - 2.2.5 First-Floor Elevator Lobby Roof 8
     - 2.2.6 Plaza above the Southeast Basement Offices 9

3. WATER TESTS 10

4. DISCUSSION AND CONCLUSIONS 11
   - 4.1 Performance of General Facade System 11
   - 4.2 Precast Concrete Panel System 11
   - 4.3 Curtain Wall System 12
   - 4.4 Twenty-Second-Floor Balcony Parapet Coping 13
   - 4.5 First-Floor Elevator Lobby Roof 13
   - 4.6 Plaza above the Southeast Basement Offices 13

5. RECOMMENDATIONS 14
   - 5.1 Precast Concrete Panel System (PCPS) 14
   - 5.2 Curtain Wall System (CWS) 15
   - 5.3 Twenty-Second-Floor Balconies 16
   - 5.4 First-Floor Elevator Lobby Roof 16
   - 5.5 Plaza above the Southeast Basement Offices 16

6. ORDER OF MAGNITUDE CONSTRUCTION COST ESTIMATES 17
   - 6.1 Precast Concrete Panel System Estimates 17

6.2 Curtain Wall System Estimates 18
6.3 Twenty-Second-Floor Balcony Estimates 18
6.4 First-Floor Elevator Lobby Roof 18

ILLUSTRATIONS

Photos 1 through 80

APPENDIX

APPENDIX A
APPENDIX B
APPENDIX C
APPENDIX D

1. BACKGROUND INFORMATION

1.1 Building Description

The John W. McCormack Building (McCormack Building) is a twenty-two-story office building operated by the Commonwealth of Massachusetts Bureau of State Office Buildings (BSB) (Photo 1). The structural steel-framed building, designed by Hoyle, Doran, and Berry, Inc., was constructed in 1975. The building is rectangular in plan, with the long dimension oriented in the north-south direction. Exterior walls consist of exposed-aggregate precast concrete panels and glazed curtain walls (Photo 2). At the twenty-second floor, balconies are located at the top of each vertical section of curtain wall (Photo 3). The main roof and twenty-second-floor balcony roofs consist of EPDM roofing systems over structural concrete decks (Photo 4).

1.2 Initial Site Visit

On 3 March 2010, Susan L. Knack-Brown of Simpson Gumpertz & Heger, Inc. (SGH) toured the seventeenth- and twenty-second floors of the McCormack Building with Vincent Cirigliano of BSB. Mr. Cirigliano reported the following:

- Water leakage through the exterior walls has caused damage to interior finishes on multiple floors and elevations.
- Leakage does not always occur during heavy rain events; wind direction and speed reportedly affects the wall performance.

During our 3 March 2010 visit, we observed the following:

- Damage to interior finishes, observed at various locations, including:
    - Water stains on soffits and acoustical ceiling systems adjacent to the exterior wall.
    - Delaminating wallpaper and blistered paint adjacent to the exterior wall.
    - Water stains on curtain wall frames and spandrel panels.
- Interior finish damage appears to occur most frequently at building corners.
- We accessed one of the twenty-second-floor balconies and observed crazed and poorly adhered sealant at some locations.
- Some portions of the curtain wall sealant appear to have been replaced since the original installation.

1.3 Existing Drawings Review

We reviewed the following original building architectural drawings by Hoyle, Doran and Berry, Inc., dated 2 August 1972 (we provide Drawing A-63 and A-102 in Appendix A following this report):

- Detail Titled “Anchor Locations Typical 12’-6” Story Height Panel”/A-102: This detail shows a horizontal 3/8 in. sealant joint between precast concrete panels. The horizontal joints are typically spaced at 12 ft-6 in. o.c.

- Detail Titled “Plan thru Enclosure”/A-63:

    - A vertical 14 ga stainless steel track guide for window washing equipment is shown in the center of precast concrete panels.
    - This detail shows the interface between the precast panel and curtain wall. In plan section, the curtain wall jamb extends behind a 2 in. extension of the precast panel. The space between the precast panel and the curtain wall jamb is filled with a 3/8 in. sealant on the exterior and a continuous bent plate on the interior (Note plate was not visible on the interior during our review).
    - This detail indicates that the sealant at precast panel joints is approximately 1/2 in. deep.

- Section ‘C’-‘C’/A-63: This detail shows the window-washing track at the bottom half of the precast concrete panel horizontal joint. A closed cell compression seal is shown in line with the track and a note states to extend the stainless steel track 1/4 in. above the top of the precast panel at the joints.

- Elevation drawings typically indicate that the curtain wall system has single-pane glazing; however, an exception is noted at the eighth floor where insulating glass units were originally installed. We confirmed insulating glass units are installed at the northeast corner room.

1.4 Information from Others

On 19 March 2010 Brian Rittershaus of BSB provided us with a leakage log that he prepared on 16 March 2010 during a heavy rain event (Appendix B).

During our investigation, Mr. Rittershaus and many of the building occupants provided anecdotal information about the location, frequency, and most recent occurrence of leaks.

2. FIELD OBSERVATIONS

2.1 Interior Observations

On 8 September 2010, John N. Karras and Rebecca H. Priebe of SGH performed an interior survey of select locations along the perimeter of the building. The locations we surveyed were primarily on various floors of the north and east elevations and correlated with leak locations indicated on the 16 March 2010 BSB leakage log. We also visited some locations on the west and south elevations. Mr. Rittershaus of BSB accompanied us during our interior survey.

At BSB's request, we returned to the building on 4 March 2011 to observe interior conditions at two additional discrete locations at which BSB reports chronic leakage. These additional locations, the first-floor elevator lobby at the southwest corner of the building and the basement office space at the southeast corner of the building, are located below a small copper roof and the main entrance plaza respectively.

The following sections summarize our interior observations.

2.1.1 General Interior Finish Systems

All floors of the McCormack Building contain finished office space, except for the seventh floor and twenty-second floor which contain mechanical spaces. Office space interior finishes at the building perimeter typically consist of carpet on concrete slab, exposed curtain wall framing and glazing, gypsum wallboard (GWB) partition walls, and acoustical ceiling systems with GWB and metal soffits adjacent to the curtain wall (Photos 5 and 6). The sill portion of each curtain wall bay is typically covered by mechanical unit enclosures with laminated, removable wood stools (Photo 7). The curtain walls typically include vertical blinds with receptor tracks screwed to the underside of horizontal mullions (Photo 8).

2.1.2 Interior Observations Behind Precast Concrete Panels

GWB partitions typically cover the inboard face of the precast concrete panels and the structural steel columns in-line with the panels (Photo 9). We noted widespread peeling paint, delaminating wallpaper, GWB damage, and staining on these interior partitions (Photos 10 through 12). Other typical damage adjacent to these interior partitions includes water stains and corrosion on metal soffits and water stains on acoustical ceiling systems (Photos 13 and 14). Although we observed the damage noted above most frequently at the north and east

elevations, particularly at the northeast building corner, we also noted similar damage at some locations on the south and west elevations.

At the unfinished seventh-floor mechanical space, we observed water staining on the inboard face of precast concrete panels (Photos 15 and 16). Additionally, we observed that the curtain wall jamb mullion extends past the vertical termination of the precast concrete panel at the precast / curtain wall interface (Photo 17). The precast concrete panel / curtain wall jamb mullion interface is sealed on the interior side of the interface; the sealant is installed with fillet geometry and exhibits an inconsistent profile (Photo 18). We observed water staining on the curtain wall jamb mullion at this location (Photo 19).

2.1.3 Curtain Wall System

We observed water staining on the interior of several curtain wall components including horizontal mullions, vertical mullions, and spandrel panels (Photos 20 through 22). Water stains on curtain wall components were typically dry. The locations of water stains we observed on curtain wall components were distributed throughout the building and were not limited to discrete elevations or floors.

2.1.4 Twenty-First-Floor Conference Room 3

Conference Room 3 on the twenty-first floor is at the northeast corner of the building (Photo 23). Interior finishes are similar to other typical office spaces, except the conference room includes a secondary (GWB) soffit inboard of the metal soffit adjacent to the curtain wall (Photo 24). During our interior survey, building maintenance personnel reported that they have observed recent leakage along the curtain wall / ceiling interface at the north elevation of the conference room (Photo 25).

2.1.5 First-Floor Elevator Lobby

The elevator lobby at the southwest corner of the first floor, servicing the parking garage and Bowdoin Street building entrances (Photo 26), is located in a wing off of the west side of the main lobby. Interior finishes include stone floor tiles, granite wall cladding, and acoustical ceiling tiles. Mr. Rittershaus reported that during heavy rain events water cascades down the face of the granite cladding on the elevator walls (Photo 27). We observed faded staining on these granite cladding panels. In addition, we observed staining on the acoustical ceiling tiles aligned with the elevator cladding and below the internal roof drain of the copper roof above the elevator lobby (Photo 28). Through a missing ceiling tile, we observed that the termination of

the metal roof deck above aligns with the face of the elevator wall granite panels, and the concrete beam between the roof deck and the elevator wall below is water stained (Photo 29). Additionally, the body of the internal roof drain above the stained ceiling tile noted above is water stained (Photo 30).

2.1.6 Southeast Basement Office Space

The basement is at the southeast corner of the building contains office space for the BSB Chief Executive Officer (CEO) and associated support staff. Interior finishes in this space include carpet on a concrete slab, GWB partitions, and acoustical ceiling tiles (Photo 31). We observed two stained ceiling tiles at the east end of the CEO's office (Photo 32). Within the ceiling cavity above the stained ceiling tiles, we observed a CMU/concrete wall located behind the GWB partition adjacent to the stained ceiling tiles (Photo 33). The concrete structural deck above the ceiling plenum appears to have a control joint aligned with the CMU/concrete wall; we observed the control joint actively leaking (Photo 34).

2.2 Exterior Observations

Our exterior observations are based on industrial rope access drops by Susan L. Knack-Brown and Nick T. Floyd of SGH at the north end of the east elevation on 15 September 2010 (Photo 35); we show the drop locations on elevations in Appendix C. Vertical Access LLC provided industrial rope access support. Additionally, John N. Karras and Rebecca H. Priebe made observations from the ground and from the twenty-second-floor balconies and main roof on 15-17 September 2010.

At BSB's request, John N. Karras returned to the building on 4 March 2011 to observe exterior conditions at two additional discrete locations noted above where BSB reports chronic leakage. These additional locations include the first-floor elevator lobby roof at the southwest corner of the building and the plaza above the basement office space at the southeast corner of the building.

The following summarizes our observations.

2.2.1 General Building Layout and Building Envelope Systems

The first- and second-floor exterior walls at all elevations of the McCormack Building are located inboard (varies from approximately 10 to 25 ft) of the third-to-twenty-second-floor exterior walls above. The first- and second-floor exterior walls generally consist of glazed curtain walls;

although the curtain wall construction at these locations appears to be of the same vintage as the remainder of the building, these locations were outside of our investigative scope of work.

The McCormack Building includes a raised and exposed plaza (outside of the main building footprint) at the north end of the building and a covered plaza at the south end (main entrance) of the building. Except for our interior and exterior observations associated with the reported chronic leakage below the plaza at the southeast corner of the building, the plaza systems were outside of our investigative scope of work.

Roof construction primarily (i.e., at the twenty-second-floor balconies and at the main roof) consists of single-ply EPDM membrane systems. As discussed further below, the roof system over the first-floor elevator lobby consists of batten-seam and flat-seam copper construction. We understand that a portion of the main EPDM roof membrane is un-adhered and currently ballasted with elevator weights, and that BSB is planning on replacing portions of the main EPDM roof that are un-adhered. Except for our exterior observations associated with the reported chronic leakage below the first-floor elevator lobby copper roof and at the twenty-second-floor balconies, roof systems were outside of our investigative scope of work.

Exterior wall systems at the McCormack Building consist of exposed-aggregate precast concrete panels and glazed curtain walls. Curtain wall sections each span from the third- to the twenty-first floor (Photo 36). The east and west elevations include seven vertical curtain wall sections; the north and south elevations include five vertical curtain wall sections. The field of the curtain wall projects beyond the plane of the precast concrete panels; the curtain wall returns to meet the precast concrete panel at an angle (Photo 37). The curtain wall includes opaque spandrel glass at floor lines and at the seventh-floor mechanical space.

Vertical strips of exposed-aggregate precast concrete panels divide adjacent vertical curtain wall sections and in addition form the corners of the building (Photo 38). Each panel is approximately one-story high; horizontal joints in the precast concrete panels typically occur at floor lines (Photo 39).

2.2.2 Precast Concrete Panels

The field of the exposed-aggregate precast concrete is generally in sound condition (Photo 40); we observed and removed one precast concrete spall at the twenty-second-floor by hand

(Photo 41). We observed some discrete embedded metal anchors in the tops of precast concrete panels (Photo 42).

The vertical strips of precast concrete panels typically include a continuous vertical window-washing track lined with stainless steel sheet metal along the centerline of the precast concrete (Photo 43). Joints in the stainless steel liner align with horizontal joints in the precast concrete panels; most joints in the stainless steel liner are greater than 1/2 in., are not sealed, and the compressible filler material in the precast concrete panel horizontal joint is exposed (Photo 44). Many joints in the stainless steel liner have significant calcium carbonate deposits exiting the joint (Photos 45 and 46). At the top of the wall, the top of the stainless steel track is exposed (Photo 47).

Sealant in the vertical and horizontal precast concrete joints is typically crazed (Photo 48). The vertical sealant joint at the interface of the precast concrete panels and the curtain wall jamb is also typically crazed (Photo 49). This sealant joint is applied directly to the exposed-aggregates on the precast panel resulting in many small openings between individual aggregates that the sealant does not fill (Photo 50). We made one exploratory opening in the vertical sealant joint at the interface of the precast concrete panels and the curtain wall jamb (Photo 51). Through the exploratory opening, we observed the back-side of an interior sealant joint between the curtain wall jamb and the precast panel; the transition from precast concrete to the curtain wall lacks flashing. We sealed the exploratory opening with sealant prior to leaving the site.

2.2.3 Curtain Wall System

The curtain wall system consists of aluminum framing, and, with limited exceptions, single-pane glass. We did not locate any markings on the glazing, or any references in the original building drawings, indicating whether the glass is safety glazing.

We note that the curtain wall system, glazing, and associated sealants, while aged, is generally in sound condition though in most locations remedial wet-seals have been applied. Discrete defects that we note within the curtain wall system include the following:

- Some splits in “wet seals”, i.e. seals between the glazing and framing components (Photo 52).
- Incompatibility between curtain wall wet seal sealant (silicone) and precast concrete joint sealant (urethane) resulting in debonded interfaces between the two materials (Photo 53).

- Crazing of glazing films at several locations (Photo 54).

The curtain wall jamb extrusions and vertical mullion extrusions typically include expansion butt-joints at floor lines (Photo 55). The butt-joints consist of an approximately 1/2 in. gap between adjacent jamb extrusions. This gap is filled with sealant; the top and bottom of the sealant appear to be bonded only to the edge of the extrusion profile. At some locations, sealant at the butt-joint is smeared over the surface of the jamb/mullion (Photo 57).

Curtain wall horizontal mullions typically include one weep at each glass lite (Photo 57). At the third-floor level, there is a flashing below the sill extrusion; the bottom of each vertical extrusion is open and the sill extrusions have the typical weeps (Photo 58).

2.2.4 Twenty-Second-Floor Balconies

The twenty-second-floor balconies are bounded by a parapet wall, the sides of the precast concrete panels, and the exposed-aggregate precast concrete rising wall of the twenty-second-floor mechanical penthouse. The outboard side of the parapet wall consists of a spandrel section of curtain wall up to the parapet coping. The parapet coping is constructed sheet metal with standing-seam and loose-lap joints, some of which have been covered with duct tape by building maintenance personnel (Photos 59 and 60). The inboard side of the parapet is clad with EPDM membrane which is integral with the EPDM membrane on the balcony roof (Photo 61). The EPDM membrane has a stamp indicating a 1993 date of manufacture. At the parapet coping's interface with the precast concrete panels, the coping is flanged to the side and up; the flanges are fastened to the precast concrete with nail-in fasteners and expansion sleeves and the side terminations of the flanges are not sealed (Photo 62). The top terminations of the coping flanges against the precast concrete rising wall are sealed with sealant; the sealant is crazed and poorly bonded to the exposed aggregate precast (Photo 63). The termination lacks counterflashing.

2.2.5 First-Floor Elevator Lobby Roof

The roof above the first-floor elevator lobby at the southwest corner of the building consists of the following three portions (Photo 64):

- Steep-slope batten-seam copper roof.
- Low-slope flat-seam copper roof.
- Flat-seam copper gutter; the west side of the flat-seam copper gutter aligns approximately with the elevator wall with reported chronic leakage below.

The following summarizes our exterior observations at the elevator lobby roof:

- We observed an approximately 1/4 in. diameter opening at the batten-seam-roof-to-south-parapet-cladding transition (Photo 65).

- A precast concrete wall panel is located at the south end of the elevator lobby roof; the concrete panel has a horizontal joint with sealant that is crazed, split, and debonded from the panel's exposed aggregates (Photos 66 and 67).

- We observed several discrete cracked solder joints at the batten-seam roof to flat-seam gutter transition (Photo 68), and within the field of the flat-seam gutter and low-slope roof.

- The accessories of the internal drain in the flat-seam copper gutter are deteriorated, including the clamping ring which is corroded and broken (Photo 69). The gutter copper turns approximately 1/2 in. into the drain bowl (Photo 70).

- The flat-seam copper gutter and low-slope copper roof include heat trace elements; Mr. Rittershaus noted that he does not know if the heat trace system is operable.

- We did not observe any provisions for copper expansion within the gutter or low-slope roof.

2.2.6 Plaza above the Southeast Basement Offices

The plaza wearing surface consists of brick pavers and granite paver trim (Photo 71). The plaza transitions to a concrete-paved wheelchair ramp along the approximate line of the basement office partition below. The paving systems and wheelchair ramp are intact; we were not able to make any observations regarding the existence of, or condition of, the waterproofing on the structural slab below the paving systems.

3. WATER TESTS

Using a calibrated spray rack and a handheld nozzle, we performed water tests on the curtain wall, precast concrete panel system, and the interface between the two systems. Additionally, we performed water tests at a twenty-second-floor balcony. We performed all water tests at zero pressure differential except for a differential pressure water test at the seventh-floor that did not produce leakage. Appendix D summarizes the results and location of each water test. During testing, we replicated the following leakage paths.

- Water enters through open joints in the precast concrete panel system's stainless steel window washing track liners, travels down the inboard face of the precast panels, onto concrete floor slabs, and then distributes onto various interior finish components (Photos 72 through 75). The water leakage that we reproduced during this testing replicated the widespread interior finish staining and damage we observed in-line with the precast concrete strips.

- Water enters the vertical sealant joint at the interface between the precast concrete panels and the curtain wall jamb (Photo 76) and the curtain wall jamb expansion butt-joint at the curtain wall jamb (Photo 77). The water travels down the interior of the jamb extrusion (Photo 78). Although we were not able to run a water test long enough to verify, we suspect that during a sustained rain event, water that penetrates eventually flows onto concrete floor slabs and distributes similar to the leakage noted above.

- Water enters through open lap joints in the twenty-second-floor balcony parapet copings, flows onto the balcony structural concrete slab, rolls off the edge of the structural slab (Photo 79), and pools on the metal soffit adjacent to the curtain wall at the east elevation of the twenty-first-floor Conference Room 3 (Photo 79). The water pools on the metal soffit until it overtops, and then pools on top of the adjacent plaster soffit (Photo 80).

4. DISCUSSION AND CONCLUSIONS

4.1 Performance of General Facade System

From a waterproofing standpoint, the McCormack Building facades, appears to be acting as a barrier wall system. Barrier wall systems have no secondary waterproofing layer or drainage plane, and must exclude all water at the outermost surface to prevent leakage (unlike cavity walls, which can admit water past the outermost surface, and control it via secondary waterproofing and flashings). The waterproofing performance of barrier walls relies heavily on sealants, and as sealants inherently degrade due to differential movement, ultraviolet exposure, moisture exposure, and material incompatibilities, barrier wall systems frequently develop weak points at sealant joints, particularly at interfaces between differing wall systems.

The one exception to the barrier wall performance of the facade is that the curtain walls have weeps in the system that appear to be designed to channel any water that enters the system back to the exterior. Given the infrequency of weeps, it is unclear is they are successful at redirecting water to the exterior (discussed more below).

From an energy performance standpoint, the McCormack Building facades include several detrimental characteristics:

- Single-pane (non-insulated) glass within the curtain wall (with only limited exceptions).
- Lack of thermal insulation inboard of the precast concrete panels.
- Lack of an air barrier.

Although energy modeling or thermal imaging of the exterior walls was outside of the scope of services you requested, based on our experience with buildings with similar wall construction, we suspect that these items render the building extremely inefficient with regard to energy consumption.

4.2 Precast Concrete Panel System

A significant source of water infiltration and cause of damage to interior finishes at the McCormack Building is open joints in the precast concrete panel system's stainless steel window washing track liners. The top termination of the stainless steel track is exposed and allows water behind, many adjacent track sections are misaligned resulting in openings at the joints, and the exposed compressible filler between the precast concrete panels is not a watertight material.

Sealant joints within the precast system are also deteriorated and are a likely source of water entry. Exacerbating the sealant deterioration is the articulated surface of exposed aggregates on the concrete panels, which makes the precast a poor sealant substrate, resulting in a poor sealant bond and systemically vulnerable joints.

With the breaches in the barrier wall system, the stainless steel window washing track, and the sealant joints, once water is behind the barrier wall system there is no secondary system to collect the water and drain it to the exterior.

4.3 Curtain Wall System

We believe that the curtain wall system, though near the end of its service life, is currently performing marginally with respect to water management due to apparent recent wet sealing campaigns. The curtain wall system, based on the systemic staining we observed, has likely experienced significant water leakage during its service life though we did not reproduce any in the field of the curtain wall during our testing. Although some weeps exist (one weep per glass lite and limited weeps at the base of the curtain wall system), the weeps are likely not effective at managing large amounts of water that bypass the glazing and framing components once the wet seals fail. Leakage may redevelop in the system over time once these joints deteriorate.

Another vulnerable detail is the joint between sections of the vertical curtain wall members. The vertical members of the curtain wall, including jamb extrusions and vertical mullions, provide for thermal expansion and contraction by an expansion butt-joint at each floor line. The termination of each extrusion at the butt-joint is likely open, i.e., there is no cap over the thin aluminum profile of the extrusion. The sealant that fills the butt-joint and is intended to keep the joint watertight is sealed only to the exposed edge of the extrusion. This “knife edge” geometry is a very poor substrate for the sealant and the sealant likely separates from the extrusion edge readily. At the jambs the condition is exacerbated because the curtain wall is hidden behind the precast and these joints cannot be maintained over time.

The vertical sealant joint at the interface between the precast concrete panel system and the curtain wall jamb is another problem area. The joint relies solely on sealant to remain watertight, however the sealant is failed (poorly bonded due to exposed aggregate surface and crazed); this joint requires frequent maintenance to remain watertight. Compounding the issue is that there is an incompatibility between sealants; the joint composed of urethane, is

incompatible with (and debonds from) the adjacent silicone curtain wall sealant. This vertical sealant joint leaked at more than one location during our water testing.

4.4 Twenty-Second-Floor Balcony Parapet Coping

The EPDM roof appears to be in adequate condition at the balconies. The loose-lap and standing-seam construction of the twenty-second-floor balcony parapet copings is the primary source of water leakage at this location. Water bypasses poorly constructed joints which rely on laps and surface seals. To preclude water penetration at the copings, the coping requires watertight construction such as a copper cap with riveted and soldered joints. Additionally, although we did not replicate leakage at the coping terminations (precast concrete panel rising wall), based on our experience with similar construction, we suspect these terminations are vulnerable to water penetration during sustained rain events.

4.5 First-Floor Elevator Lobby Roof

The various batten-seam and flat-seam copper roof components that comprise the first-floor elevator lobby roof are deteriorated to the extent that they, or the transitions between them, likely permit water penetration through the copper cladding. No water testing was completed to verify specific water paths and we made no exploratory openings to verify the construction below the copper cladding or its condition.

4.6 Plaza above the Southeast Basement Offices

The active leakage we observed into the ceiling cavity likely originates from the plaza above. However, the plaza paving system and wheelchair ramp currently make detailed observations of the plaza waterproofing system (or lack thereof) and the structural concrete deck impossible without performing an exploratory opening through the plaza overburden components.

5. RECOMMENDATIONS

Based on our investigation findings, below are our recommended repair options for addressing the leakage associated with various building components.

5.1 Precast Concrete Panel System (PCPS)

Following are our recommended options for addressing the leakage within, and at the perimeter of, the precast concrete panel system. The recommendations are generally listed in order of increasing reliability, durability, disruption, and cost. Note that PCPS Option 1 will likely be considered ordinary repairs, whereas PCPS Option 2 is likely to be considered an alteration, which may trigger additional code requirements under Chapter 34 of the Massachusetts State Building Code, 8th Edition. It is beyond our scope of work to complete a full Chapter 34 analysis of the building, but depending upon the final scope of work selected, structural, fire protection, energy, egress, or accessibility upgrades may be required by code.

PCPS Option 1 – Seal Window Washing Track Liner Joints and Replace Precast Concrete Panel Sealant

PCPS Option 1 is the least costly and least invasive of the options presented related to the precast concrete panels. While it addresses the leaks in the short-term, it does not provide a long-term solution (since the window washing track seals and precast concrete sealant have limited lifespan), and it does not address the poor performance of the panel system relative to energy consumption. Under PCPS Option 1, the precast concrete panel system remains a barrier wall system with weak points at the joints. This option includes, but is not limited to:

- Install pre-formed silicone sheet flashing seals at all joints in the precast concrete panel window washing track liners. A more durable and reliable option would be to cover the entire liner with brake-formed sheet metal that is terminated in reglets on the face of the precast panels. Either option requires covering the top termination of the window washing track with flashing (above the main roof elevation) to preclude water penetration behind the track.

- Remove and replace all horizontal and vertical sealant joints between precast concrete panels and at the precast and curtain wall intersection. A more durable and reliable option would be to replace these sealant joints with double sealant joints.

PCPS Option 2 – Panel System Overclad

PCPS Option 2 is significantly more costly, invasive, and difficult to construct than PCPS Option 1. In addition to addressing the leakage at joints in the precast concrete panel window washing track liners, precast concrete sealant joints, and the interface between the curtain wall jambs and the precast concrete panels, PCPS Option 2 presents the opportunity to upgrade the

performance of the building envelope. For maximum benefit, PCPS Option 2 should be performed concurrently with CWS Option 2, so that flashing between the two systems can be fully integrated and energy consumption performance can be maximized.

PCPS Option 2 includes the installation of a waterproofing membrane over the existing precast concrete panels and covering the membrane with continuous insulation and a new wall cladding (such as metal panels or plastic panels). The new system would also need to include flashings at all floor lines to drain water that collects on the waterproofing membrane to the exterior. Waterproofing the existing precast panels will require parging or adding sheathing to the surface of the precast concrete panels to provide a substrate suitable for waterproofing, as waterproofing materials cannot be directly applied to the exposed aggregate precast surface. This option changes the aesthetic of the building, as the existing exposed-aggregate precast concrete would be covered with a new (lightweight) cladding.

We are assuming that the existing structural building frame can support the load of the additional lightweight wall cladding, but we would need to confirm through structural calculations at the appropriate time.

5.2 Curtain Wall System (CWS)

Following are our recommended options for addressing the leakage within the curtain wall system. The recommendations are generally listed in order of increasing reliability, durability, disruption and cost. Note that Option 1 will likely be considered ordinary repairs, whereas CWS Option 2 is likely to be considered an alteration, which may trigger additional code requirements under Chapter 34 of the Massachusetts State Building Code, 8th Edition.

CWS Option 1 – Seals at Jamb and Vertical Mullion Butt-Joints

CWS Option 1 includes covering all existing curtain wall jamb and vertical mullion butt-joints with pre-formed silicone sheet flashing sealed to the extrusions. Wet seals should also be inspected and replaced where failed. The seals will require regular inspection and maintenance to check for breaches and preclude leakage. For these reasons, CWS Option 1 is not a long-term, reliable or durable solution.

CWS Option 2 – Replace Curtain Wall System

CWS Option 2 includes removing and replacing the curtain wall system with a modern, compartmentalized system with insulated glass units. Although significantly more costly and

disruptive than CWS Option 1, removal and replacement is a more long-term, reliable, and durable solution and provides the opportunity to dramatically increase the building envelope's performance with respect to energy consumption. Also, a new curtain wall system will be more reliable with respect to water leakage than the existing system in the long term.

5.3 Twenty-Second-Floor Balconies

We recommend removing and replacing the balcony parapet copings with metal copings that have reliable, watertight joints, and watertight terminations set in sealed reglets in the adjacent precast concrete. As the balcony EPDM roofing is approximately twenty years old, which is near the end of the typical lifespan for EPDM roofing, and because the roof may be damaged during the related coping work, we recommend that you also replace the EPDM roofing if budget allows.

5.4 First-Floor Elevator Lobby Roof

We recommend removing and replacing the batten-seam and flat-seam copper components of the first-floor elevator lobby roof with a monolithic, single-ply roofing system with heat-welded seams such as polyvinyl chloride (PVC).

5.5 Plaza above the Southeast Basement Offices

We recommend performing exploratory openings though the plaza overburden components (e.g., brick pavers, granite pavers) to determine location and condition of existing plaza waterproofing components.

6. ORDER OF MAGNITUDE CONSTRUCTION COST ESTIMATES

Per BSB's request, we present below conceptual order-of-magnitude construction costs associated with discrete recommended options listed above (we did not include estimates for overcladding the precast panels, as this scope needs additional investigation to determine the costs). These cost estimates are based on the conceptual options listed and not on detailed quantity take-offs or contractor pricing; we present these costs for discussion and relative comparison only. Actual construction costs and professional fees may vary substantially from our estimate due access restrictions, conditions varying from the typical conditions we observed, hidden conditions, local economic conditions, industry workload, changes in the cost of construction materials, contractors perception of risk, and other factors we cannot predict.

These cost estimates do not include soft costs such as owner's administrative costs or engineering/design fees. These estimates also do not include costs for code-mandated upgrades for egress, accessibility or fire protection.

Access costs are not included in the costs listed below. We estimate that for smaller repair projects, contractors will use swing-staging to access the building and that access costs will be in the range of $200,000. For the full curtain wall replacement, we believe that a contractor would wish to stage the entire building and access costs would be in the range of $5,000,000.

6.1 Precast Concrete Panel System Estimates

PCPS Option 1

- Install pre-formed silicone sheet flashing seals at all joints in the precast concrete panel stainless steel window washing track liners – $43,000.
- Cover the entirety of all stainless steel window washing track liners with brake-formed sheet metal – $368,000.
- Remove and replace all horizontal and vertical sealant joints between precast concrete panels (excludes penthouse walls) with single sealant joints – $375,000.
    - Alternate: Remove and replace all horizontal and vertical sealant joints between precast concrete panels (excludes penthouse walls) with double sealant joints – $625,000.

6.2 Curtain Wall System Estimates

CWS Option 2

- Remove and replace the curtain wall system with a modern, compartmentalized system with insulating glass units – $40,000,000.

6.3 Twenty-Second-Floor Balcony Estimates

- Remove and replace the balcony parapet copings with fully riveted and soldered watertight copper copings – $45,000.

- Replace the balcony EPDM roofs in kind – $55,000.

6.4 First-Floor Elevator Lobby Roof

- Replace existing batten-seam and flat-seam copper roofs with PVC roofing – $35,000.

I:\BOS\Projects\2010\100777.00-MCMK\WP\003SLKnack-Brown-R-100777.00.ptl.docx

Photo 1

John W. McCormack building. North (indicated by right arrow) and east (indicated by left arrow) elevations shown.

Photo 2

Typical exterior wall exposed-aggregate precast concrete panels (indicated by two left arrows) and glazed curtain walls (indicated by right arrow).

Photo 3

Plan view of typical twenty-second-floor balcony.

Photo 4

Main roof EPDM roofing system.

Photo 5

Typical office space interior finishes at the building perimeter. Arrow indicates location of Photo 6.

Photo 6

Typical ceiling finishes at the building perimeter.

Photo 7

Mechanical unit enclosure with laminated, removable wood stool adjacent to sill portion of curtain wall bay.

Photo 8

Vertical blinds with receptor tracks screwed to the underside of curtain wall horizontal mullions.

Photo 9

GWB partition covering the inboard face of the precast concrete panels and the structural steel columns in-line with the panels.

Photo 10

Peeling paint damage and staining on interior partition.

Photo 11

Delaminating wallpaper on interior partition.

Photo 12

GWB damage on interior partition.

Photo 13

Water stains and corrosion on metal soffit.

Photo 14

Water stains on acoustical ceiling system.

Photo 15

Arrow indicates location of Photo 16.

Photo 16

Water staining on inboard face of precast concrete panel.

Photo 17

Curtain wall jamb mullion extending past the vertical termination of the precast concrete panel at the precast / curtain wall interface. Dashed line indicates approximate line of precast vertical termination on the exterior.

Photo 18

Fillet sealant joint at precast concrete panel / curtain wall jamb mullion interior interface exhibiting an inconsistent profile.

Photo 19

Water staining on curtain wall jamb mullion.

Photo 20

Water staining on curtain wall horizontal mullion.

Photo 21

Water staining on curtain wall vertical (jamb) mullion.

Photo 22

Water staining on curtain wall spandrel panel.

Photo 23

Conference Room 3 on the twenty-first floor.

Photo 24

Secondary (GWB) soffit (indicated by left arrow) inboard of the metal soffit (indicated by right arrow) adjacent to the Conference Room 3 curtain wall.

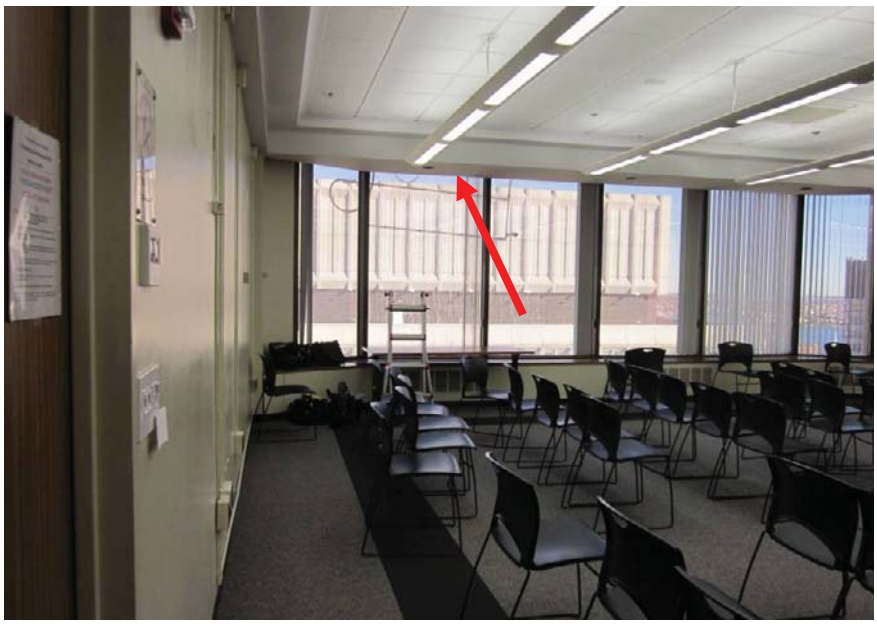


Photo 25

Approximate location of leakage reported by BSB at Conference Room 3.

Photo 26

Entrance to first-floor elevator lobby.

Photo 27

First-floor elevator wall granite cladding. Arrows indicate reported locations of water leakage.

Photo 28

Staining on acoustical ceiling tiles aligned with the elevator cladding (indicated by left arrow) and below the internal roof drain of the copper roof above the elevator lobby (right arrow).

Photo 29

Termination of the metal roof deck above the elevator lobby (indicated by upper arrow) aligning with the face of the elevator wall granite panels below (indicated by lower arrow). The concrete beam between the roof deck and the elevator wall below is water stained (indicated by middle arrow.

Photo 30

Water stained body of the internal roof drain above the stained ceiling tile shown in Photo 28.

Photo 31

Typical interior finishes in the basement office space at the southeast corner of the building.

Photo 32

Arrow indicates location of Photo 33.

Photo 33

CMU/concrete wall (indicated by lower arrow) located behind the GWB partition adjacent to the stained ceiling tiles. Upper arrow indicates location of Photo 34.

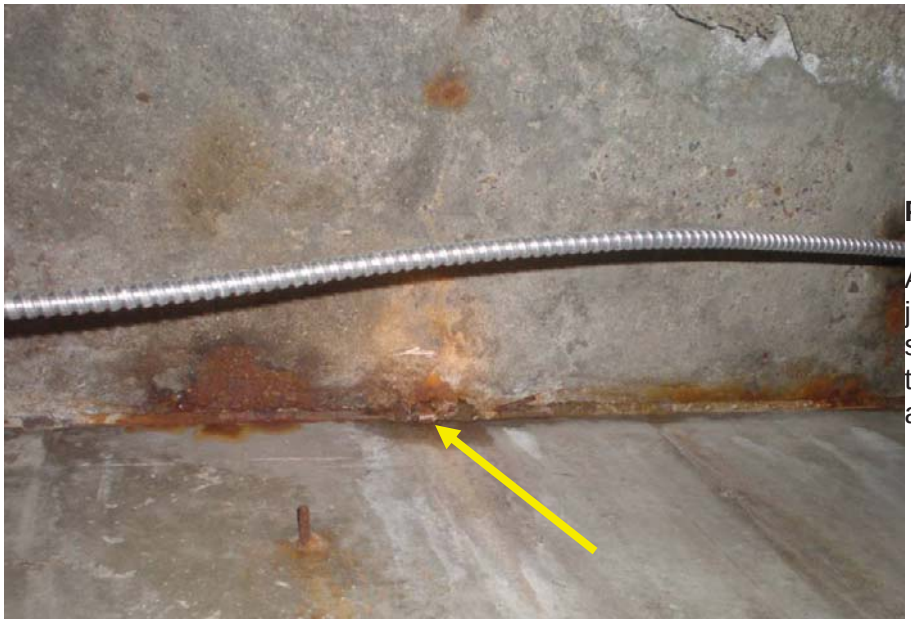


Photo 34

Actively leaking at control joint in the concrete structural deck (aligned with the CMU/concrete wall) above the ceiling plenum.

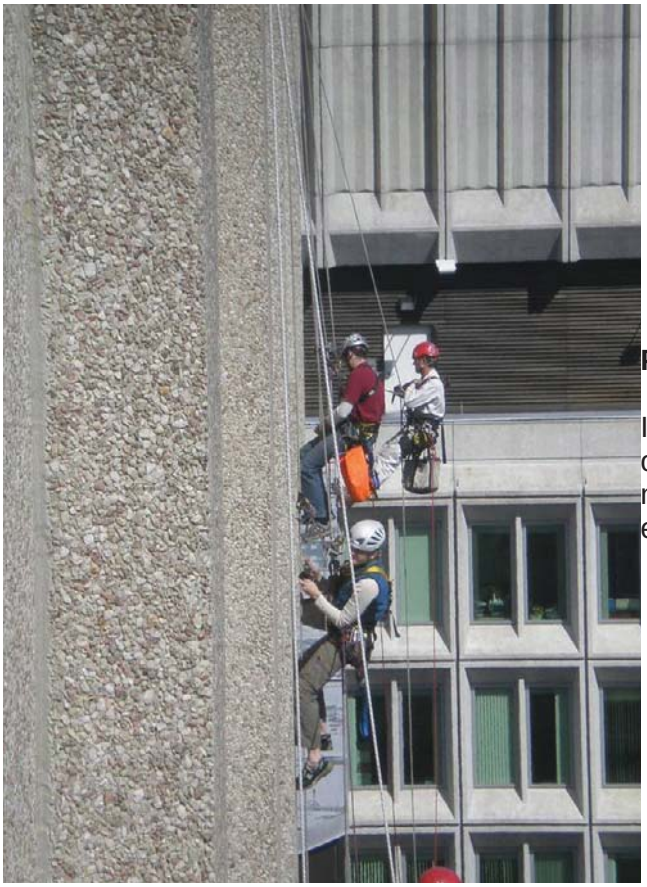


Photo 35

Industrial rope access observation drops at the north end of the east elevation.

Photo 36

Typical curtain wall spanning the third- to twenty-first floor.

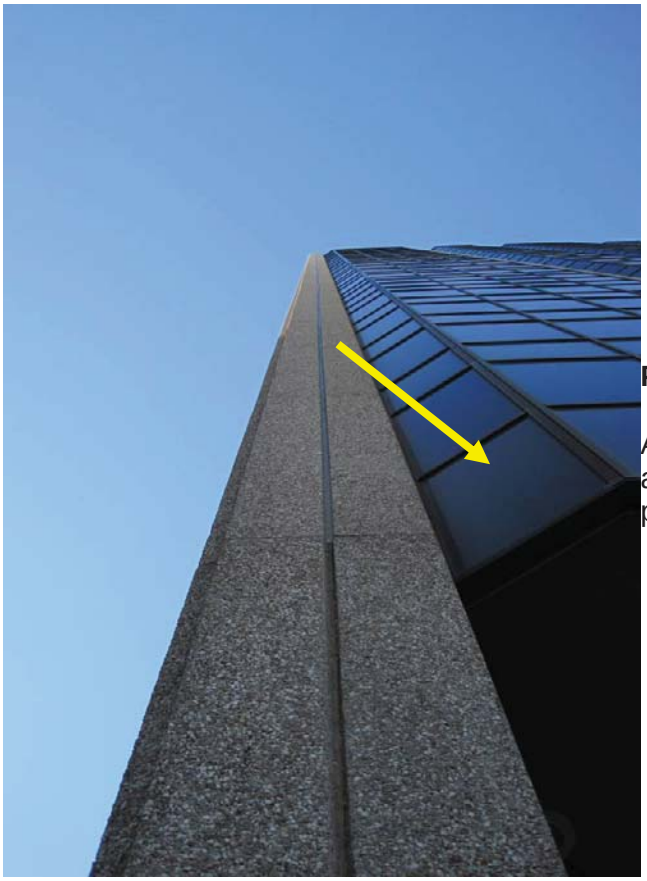


Photo 37

Angled return of curtain wall adjacent to precast concrete panel.

Photo 38

Vertical strips of exposed-aggregate precast concrete panels dividing adjacent vertical curtain wall sections (indicated by right arrow) and forming the corners of the building (indicated by left arrow).

Photo 39

Horizontal joint in precast concrete panel.

Photo 40

Exposed aggregate on the surface of precast concrete panels.

Photo 41

Discrete spall at the twenty-first floor north elevation removed by hand.

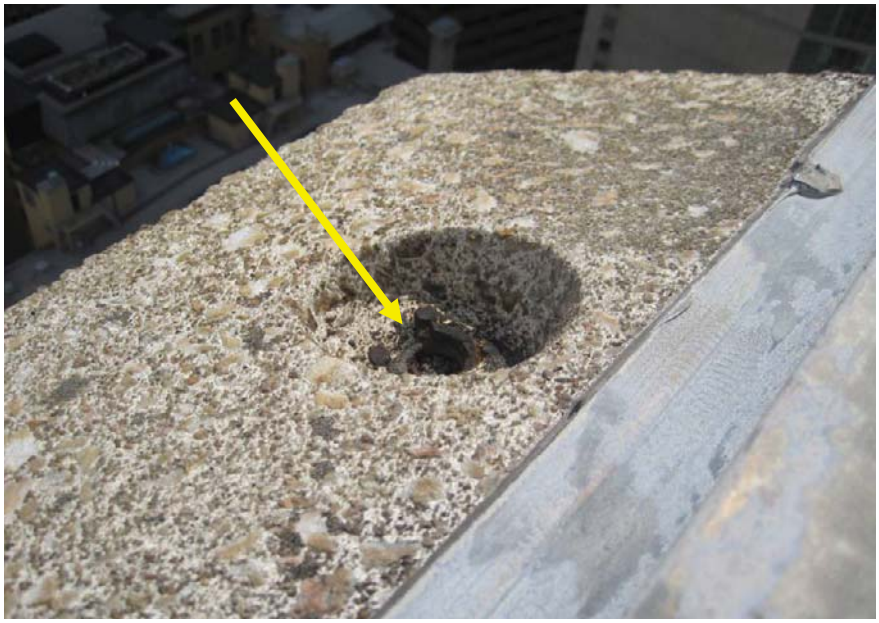


Photo 42

Embedded metal anchor in the top of precast concrete panels.

Photo 43

Continuous vertical window-washing track lined with stainless steel sheet metal along the centerline precast concrete panels.

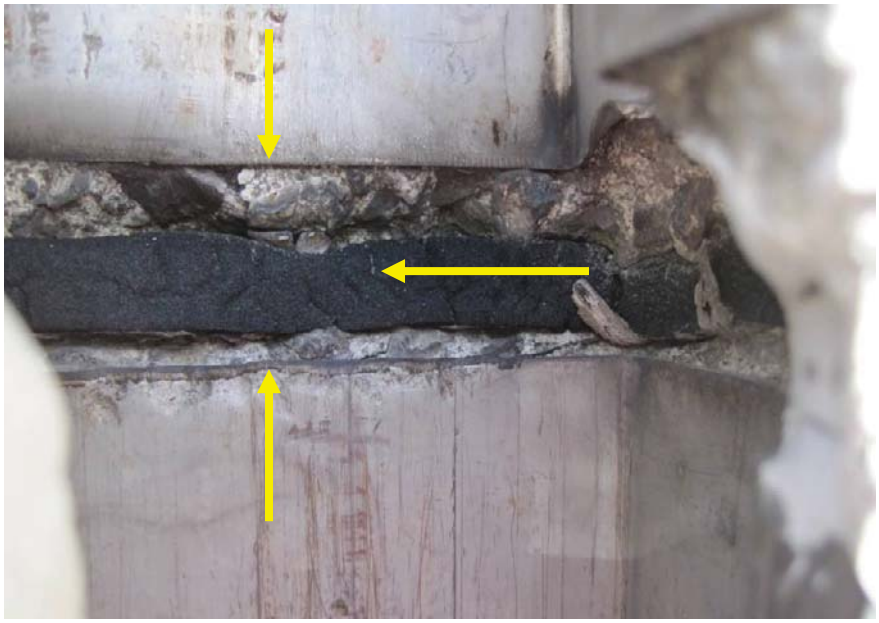


Photo 44

Transverse joint in the stainless steel window washing track liner; upper and lower arrows indicate gap in the liner. Middle arrow indicates exposed compressible filler material installed in the precast concrete horizontal joint.

Photo 45

Stainless steel window washing track liner with significant calcium carbonate deposit exiting the joint.

Photo 46

Stainless steel window washing track liner with significant calcium carbonate deposit exiting the joint.

Photo 47

Top termination of the stainless steel window washing track liner at the main roof parapet.

Photo 48

Crazed sealant in horizontal precast concrete panel joint.

Photo 49

Crazed vertical sealant joint at the interface of precast concrete panel and the curtain wall jamb.

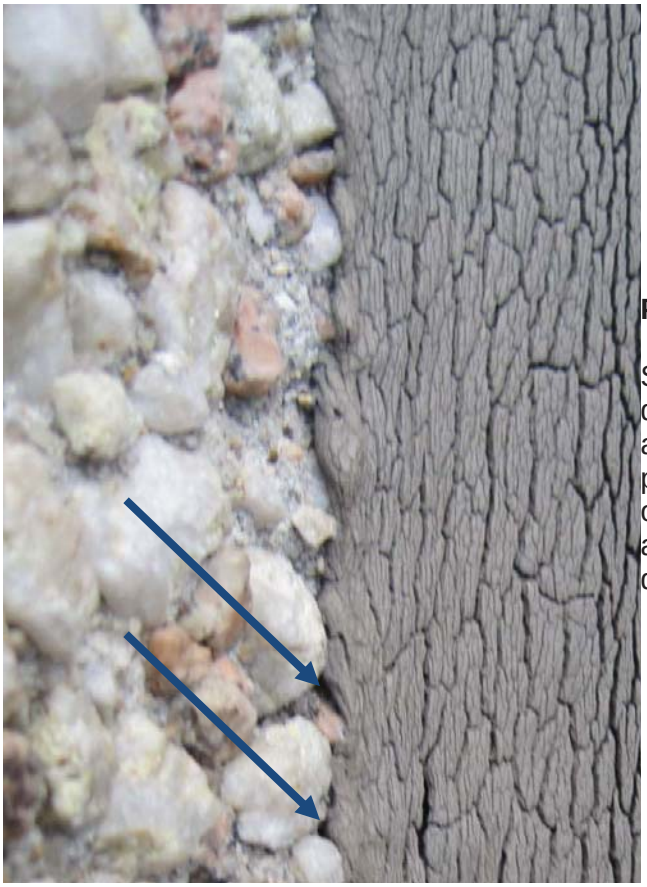


Photo 50

Sealant joint is applied directly to the exposed-aggregates on the precast panel resulting in many small openings between individual aggregates that the sealant does not fill.

Photo 51

Exploratory opening in the vertical sealant joint at the interface of the precast concrete panels and the curtain wall jamb.

Photo 52

Splits in curtain wall wet seals at glazing to framing interface.

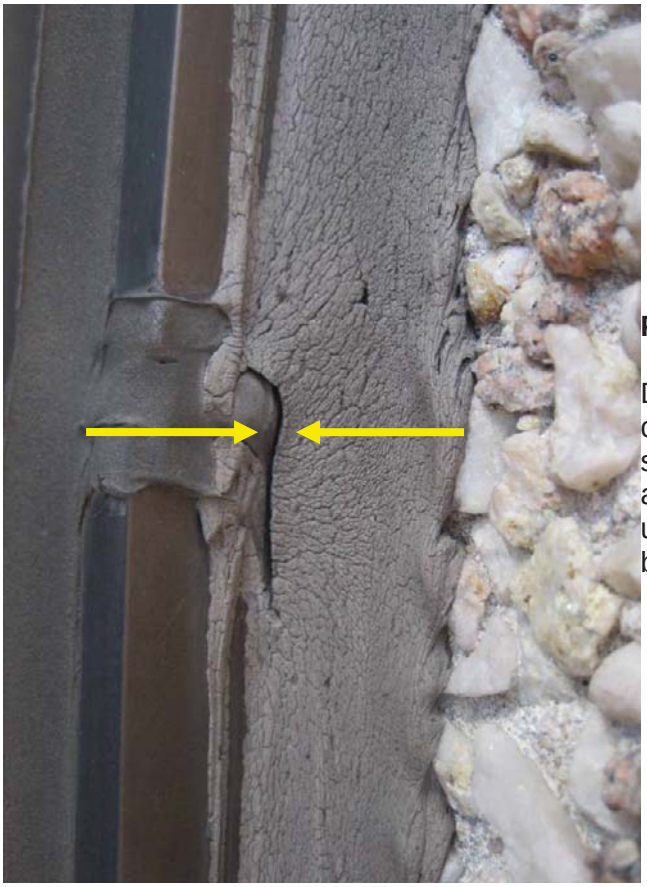


Photo 53

Debonded interface between curtain wall silicone wet sealant (indicated by left arrow) and precast concrete urethane sealant (indicated by right arrow).

Photo 54

Crazing of glazing film at the west elevation.

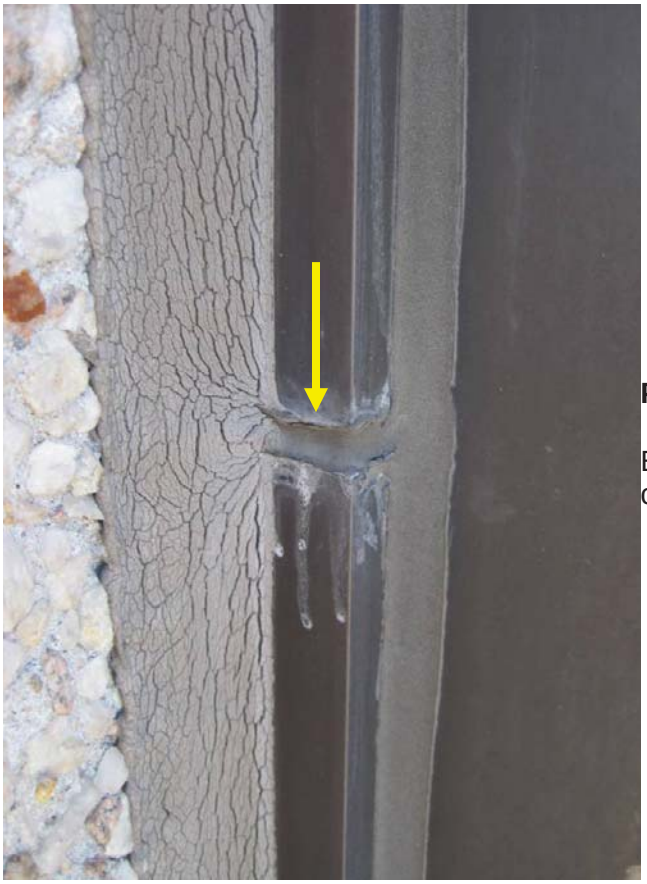


Photo 55

Expansion butt-joint at curtain wall jamb extrusion.

Photo 56

Sealant smeared over the surface of vertical mullion expansion butt-joint.

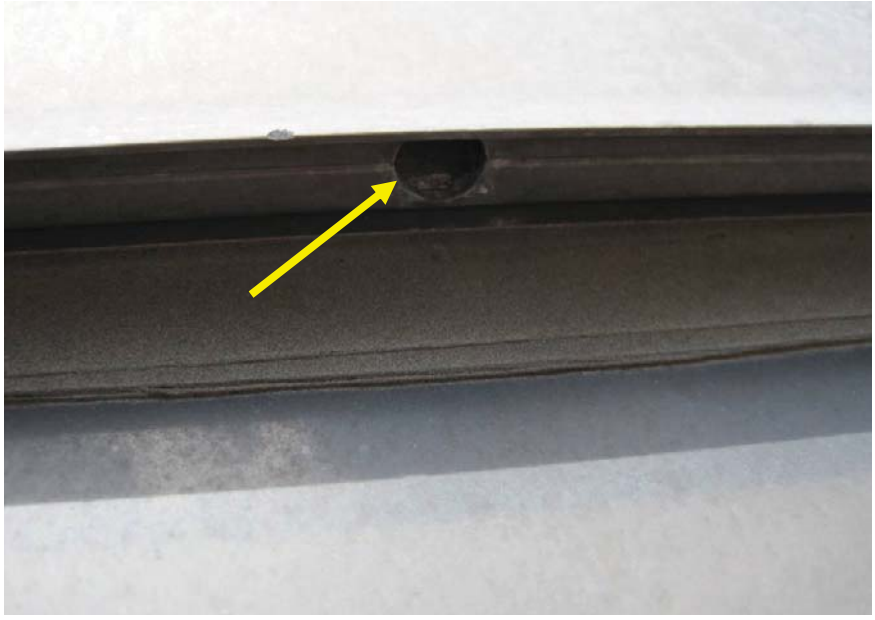


Photo 57

Curtain wall weep on underside of horizontal mullion trim cover.

Photo 58

Opening at third-floor sill extrusion.

Photo 59

Twenty-second-floor balcony coping standing-seam joint covered by duct tape.

Photo 60

Twenty-second-floor balcony coping loose-lap joint covered by duct tape.

Photo 61

EPDM membrane cladding on the inboard side of the twenty-second-floor balcony parapet.

Photo 62

Twenty-second-floor balcony parapet coping interface with side of precast concrete panel.

Photo 63

Top termination of twenty-second-floor balcony parapet coping at precast concrete rising wall.

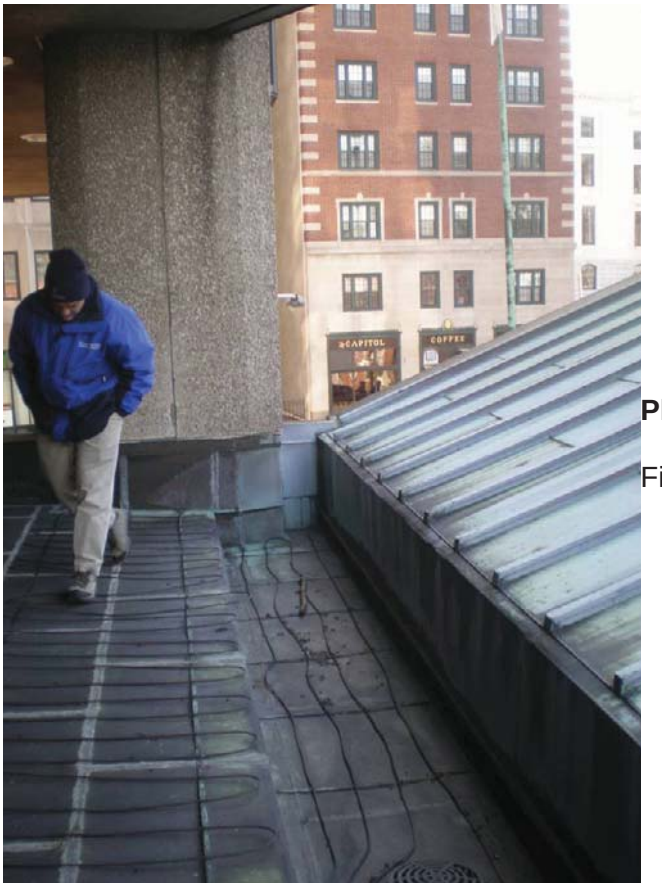


Photo 64

First-floor elevator lobby roof.

Photo 65

Approximately 1/4 in. diameter opening at the batten-seam-roof-to-south-parapet-cladding transition.

Photo 66

Precast concrete wall panel at the south end of the elevator lobby roof. Arrow indicates location of Photo 67.

Photo 67

Precast concrete wall panel horizontal joint shown in Photo 66.

Photo 68

Cracked solder joint at the first-floor elevator lobby batten-seam roof to flat-seam gutter transition.

Photo 69

Broken clamping ring at first-floor elevator lobby gutter drain.

Photo 70

First-floor elevator lobby copper gutter to drain transition.

Photo 71

Plaza wearing surfaces over southeast basement space.

Photo 72

Replicated water leakage at horizontal precast concrete panel joint during water testing. Arrows indicate line of horizontal joint.

Photo 73

Replicated water leakage traveling down the inboard face of precast concrete panel (indicated by upper arrow). Lower arrow indicates location of Photo 74.

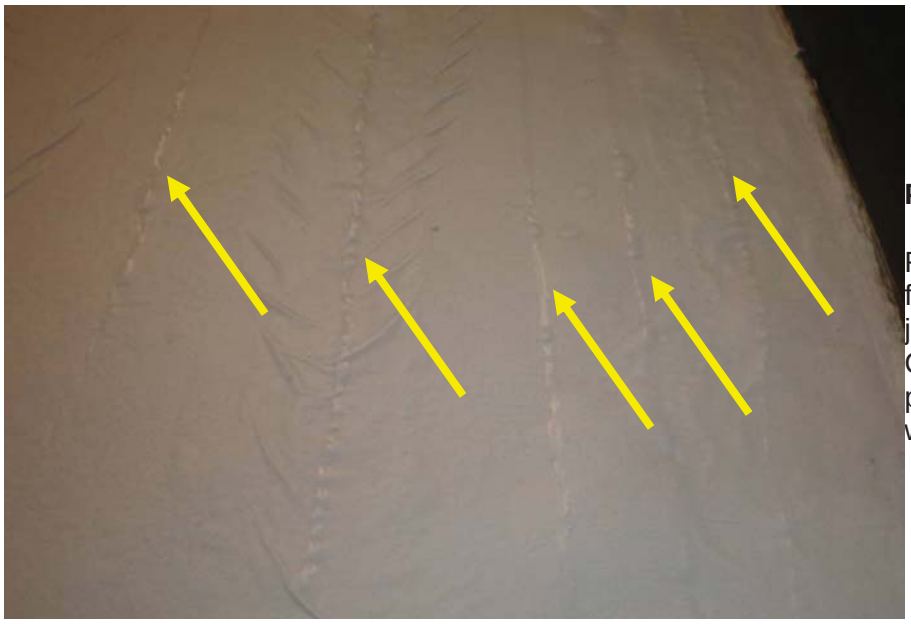


Photo 74

Replicated water leakage from precast panel horizontal joints traveling down interior GWB finishes. (Note: peeling paint on GWB behind drips was existing).

Photo 75

Replicated water leakage pooling on mechanical unit enclosure laminated stool.

Photo 76

Replicated water leakage at the interface between precast concrete panel (left) and curtain wall jamb (right).

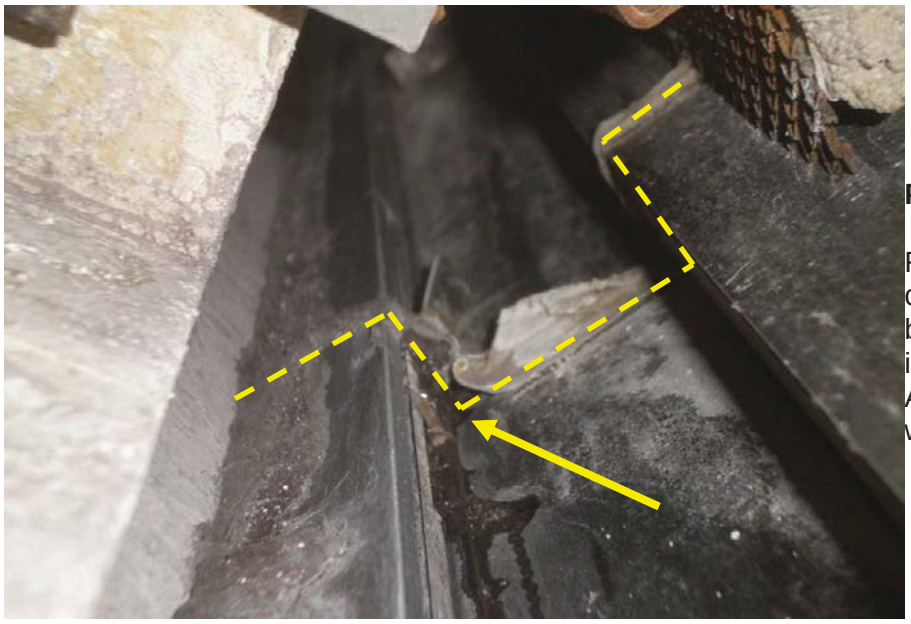


Photo 77

Replicated water leakage at curtain wall jamb expansion butt-joint. Dashed line indicates location of joint. Arrow indicates entry point of water leakage.

Photo 78

Replicated water leakage traveling down curtain wall jamb extrusion.

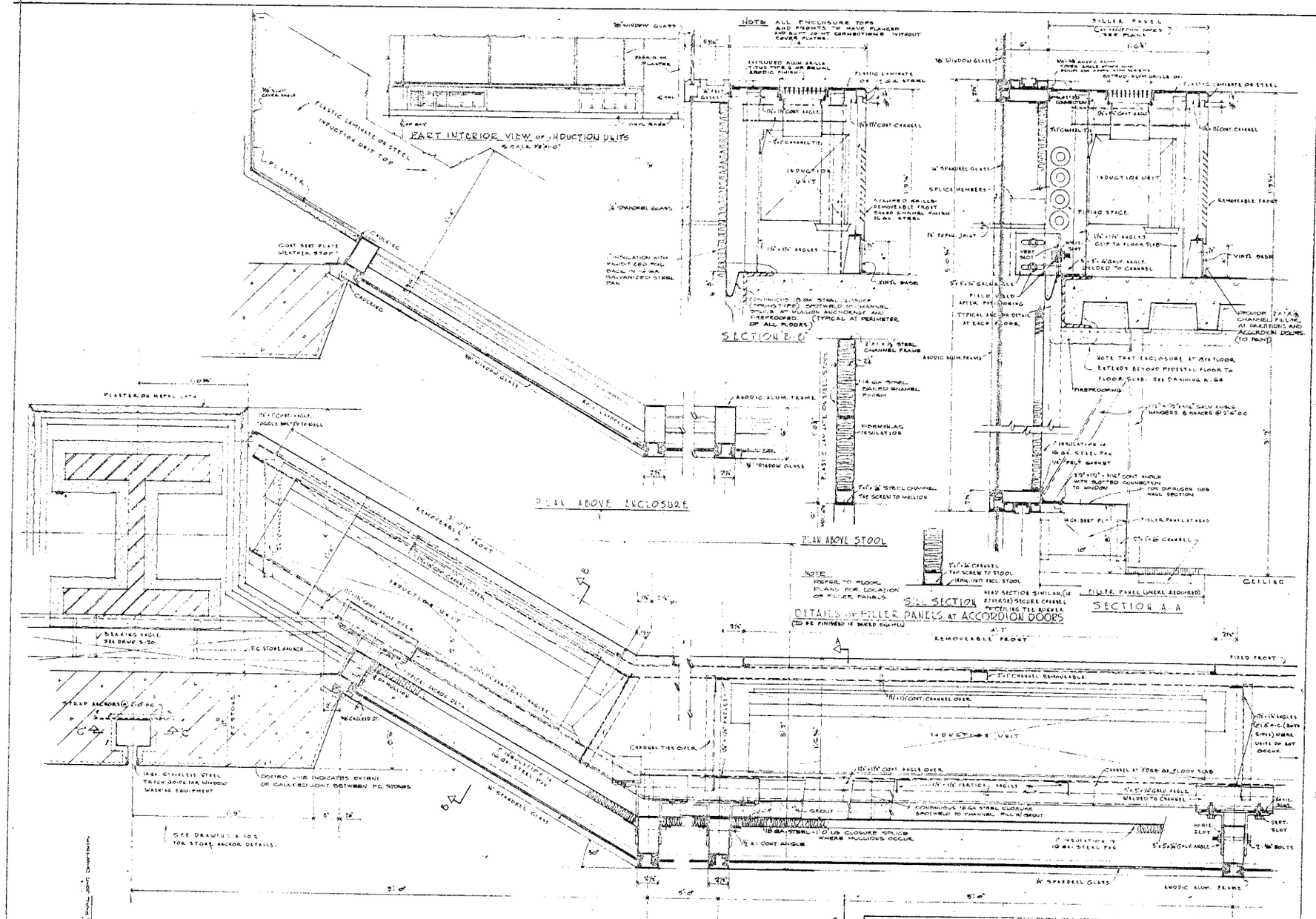
Photo 79

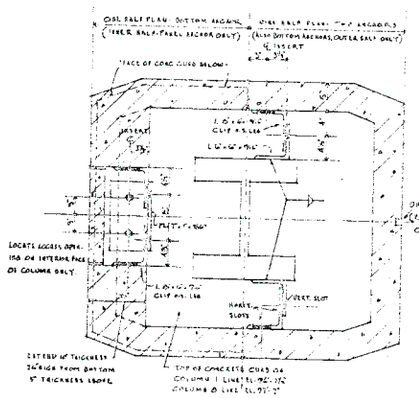
Replicated water leakage below twenty-second-floor balcony parapet rolling off the edge of the structural slab (indicated by upper arrow). Lower left arrow indicates location of metal soffit. Lower right arrow indicates plaster soffit shown in Photo 80.

Photo 80

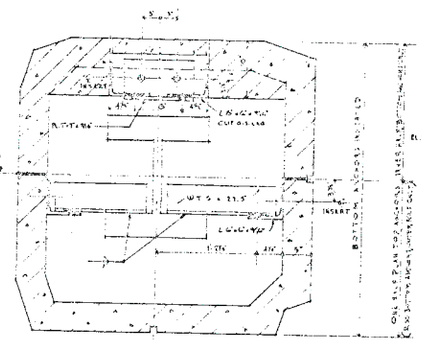
Plaster soffit with existing staining pattern consistent with replicated water leakage shown in Photo 79.

APPENDIX A

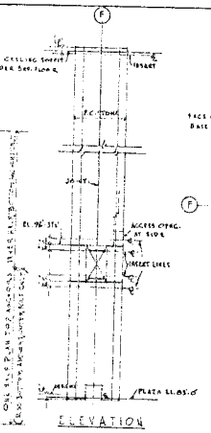

PART INTERIOR VIEW OF INDUCTION UNITS
SECTION B-B
PLAN ABOVE ENCLOSURE
PLAN ABOVE STOOL
SILL SECTION
DETAILS OF FILLER PANELS AT ACCORDION DOORS
SECTION A-A
PLAN THRU ENCLOSURE
SECTION 'C-C'
BAY WINDOW DETAILS, SHEET II
GOVERNMENT CENTER COMMISSION
OFFICE BUILDING
ONE ASHBURTON PLACE
HOYLE, TOURANJAN & SCHYLER
SCALE 3"=1'-0"
DATE 8-2-1972
COMM. 1430
APPROVED
REVISIONS
DATE
A-65



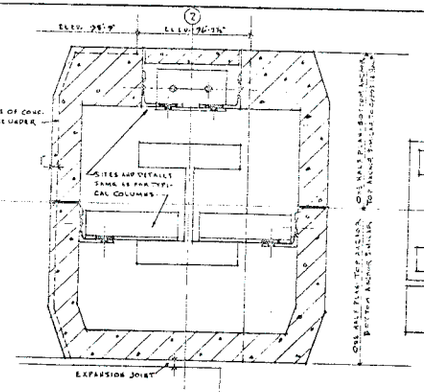
ANCHOR DETAIL COLUMN LINES 1 & 6



ANCHOR DETAIL CORNER COLUMN

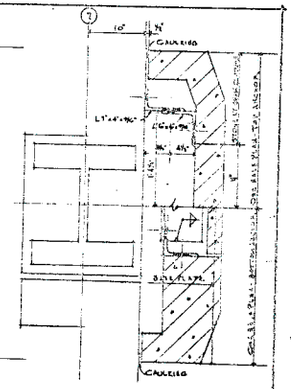


ELEVATION

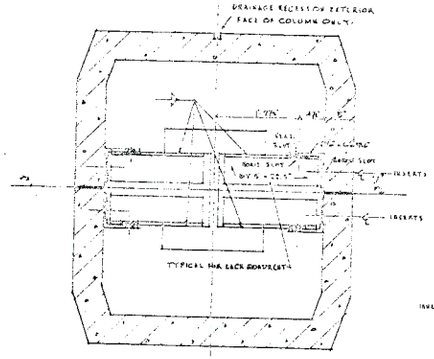


PLAN AT FIRST FLOOR PLAZA

ANCHOR DETAILS COLUMN F2

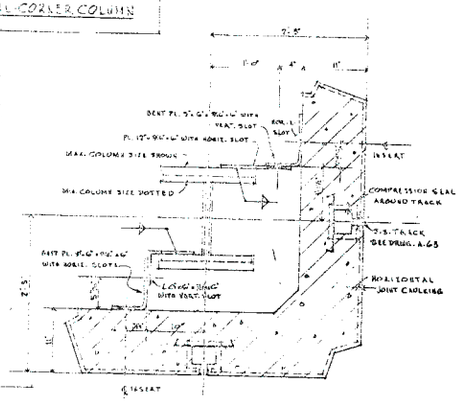


PLAN BELOW FIRST FLOOR PLAZA

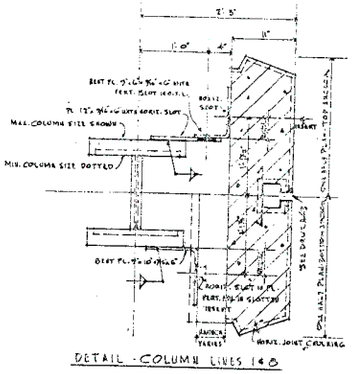


TOP ANCHOR COLUMN LINES A & F

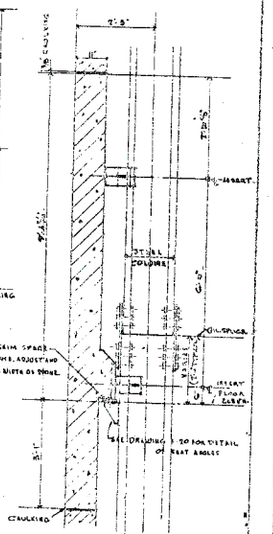
VERTICAL LOCATIONS OF PANEL INSERTS

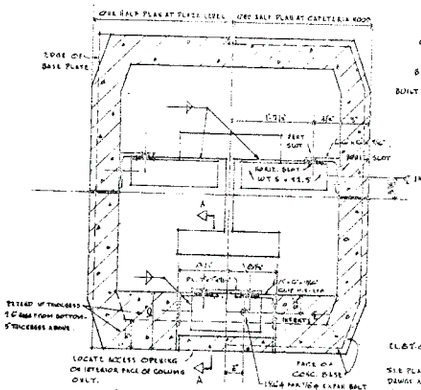


TOP ANCHOR DETAIL



DETAIL - COLUMN LINES 1 & 6

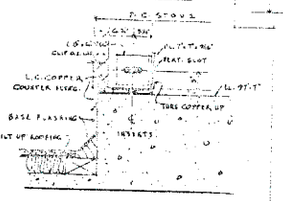




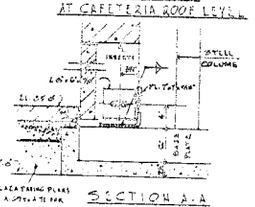
BOTTOM ANCHOR COLUMN LINES A & F

ANCHOR DETAILS - COLUMNS BELOW THIRD FLOOR

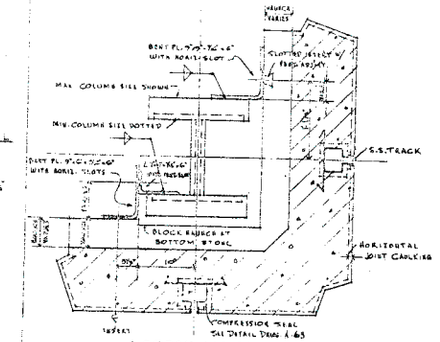
FOR PRECAST STONE DIMENSIONS SEE DWG. A-61



SECTION A-A AT CAFETERIA ROOF LEVEL

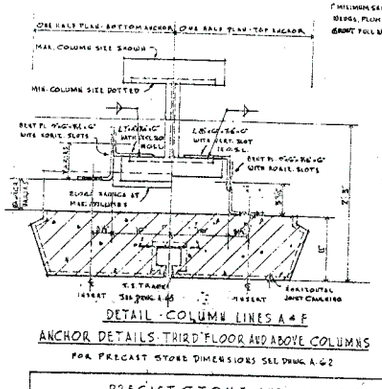


SECTION A-A AT PLAZA LEVEL



BOTTOM ANCHOR DETAIL

CORNER COLUMN DETAILS



DETAIL - COLUMN LINES A & F

ANCHOR DETAILS - THIRD FLOOR AND ABOVE COLUMNS

FOR PRECAST STONE DIMENSIONS SEE DWG. A-62

ANCHOR LOCATIONS

TYPICAL 1-6 STORY HEIGHT PANEL

NOTES:

1. FOR STRUCTURAL DESIGN AND ERECTION REQUIREMENTS FOR PRECAST STONE, SEE SPECIFICATION 7.1.0 R.
2. EACH ATTACHMENT ASSEMBLY SHALL ALLOW PRECAST SLEEVE A PERPENDICULAR OF THE ASSOCIATED STONE TO BE ADJUSTED.
3. ATTACHMENT DETAILS SHOWN ARE MINIMUM DIMENSIONS FOR STRENGTH AND ADJUSTABILITY.
4. ALL STEEL CONNECTION MATERIALS SHALL BE HOT DIPPED GALVANIZED.
5. REINFORCEMENT IN PRECAST STONE SHALL BE DESIGNED AND SHOWN ON SHOP DRAWINGS.

PRECAST STONE AND ANCHOR DETAILS

SCALE	3/4" = 1'-0"
DATE	9-7-1971
COMM.	1430
APPROVED	

GOVERNMENT CENTER COMMISSION

OFFICE BUILDING

ONE ASHBURTON PLACE

HOYLE, DORAN & BERRY ARCHITECTS BOSTON

NO.	REVISIONS	APP.

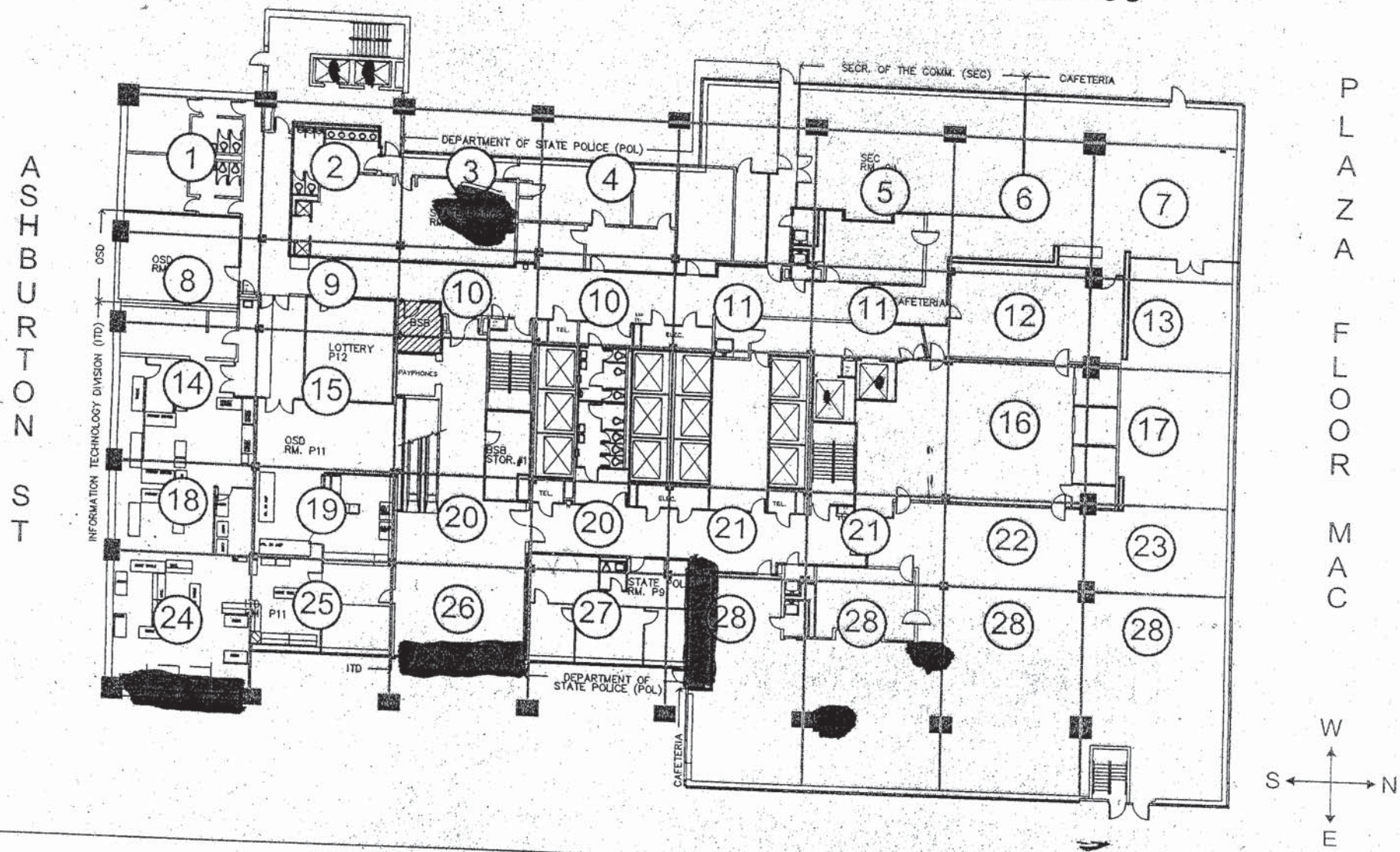
A-102

APPENDIX B

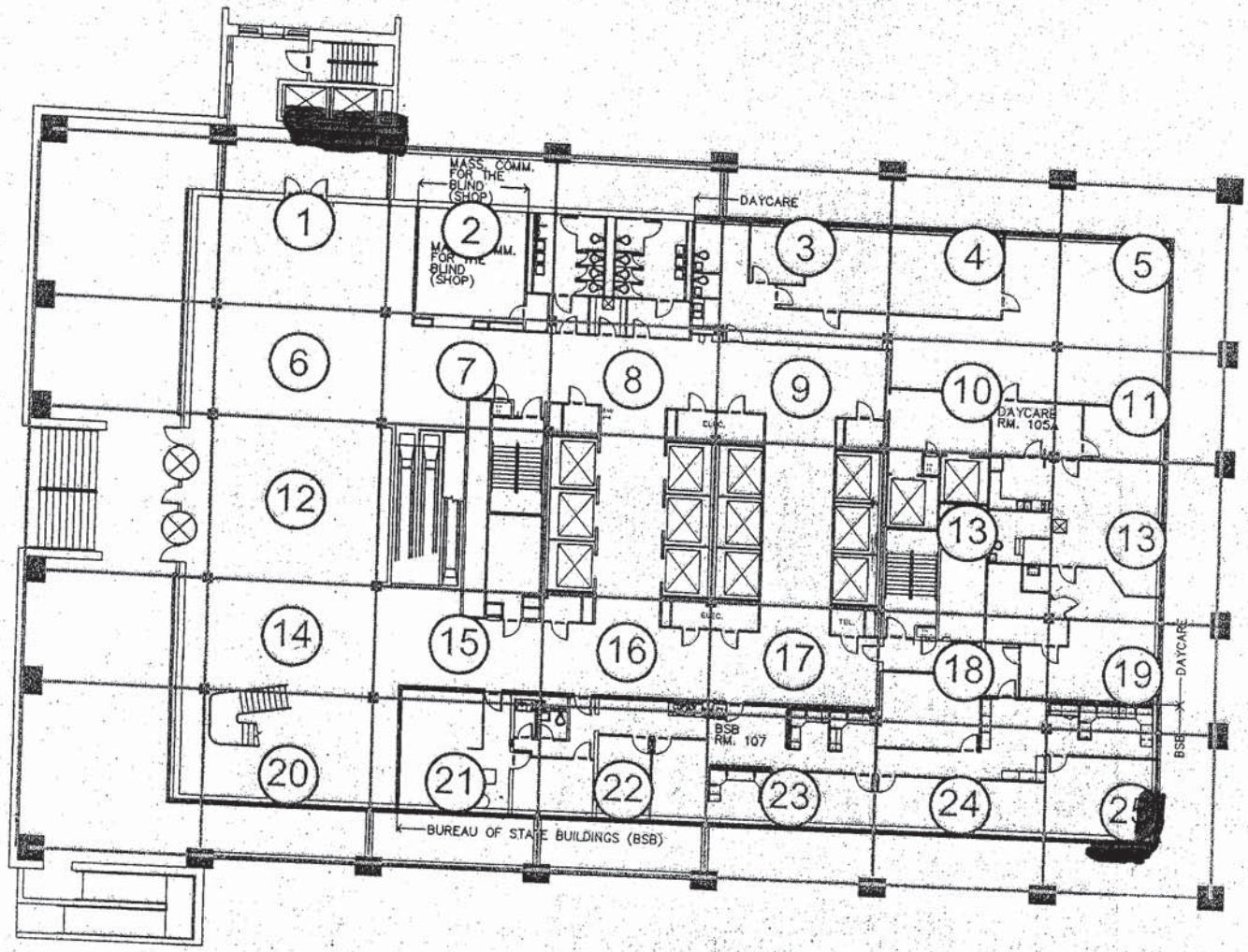
These Are Areas I Checked out 3/16/10

Survey & Design cost

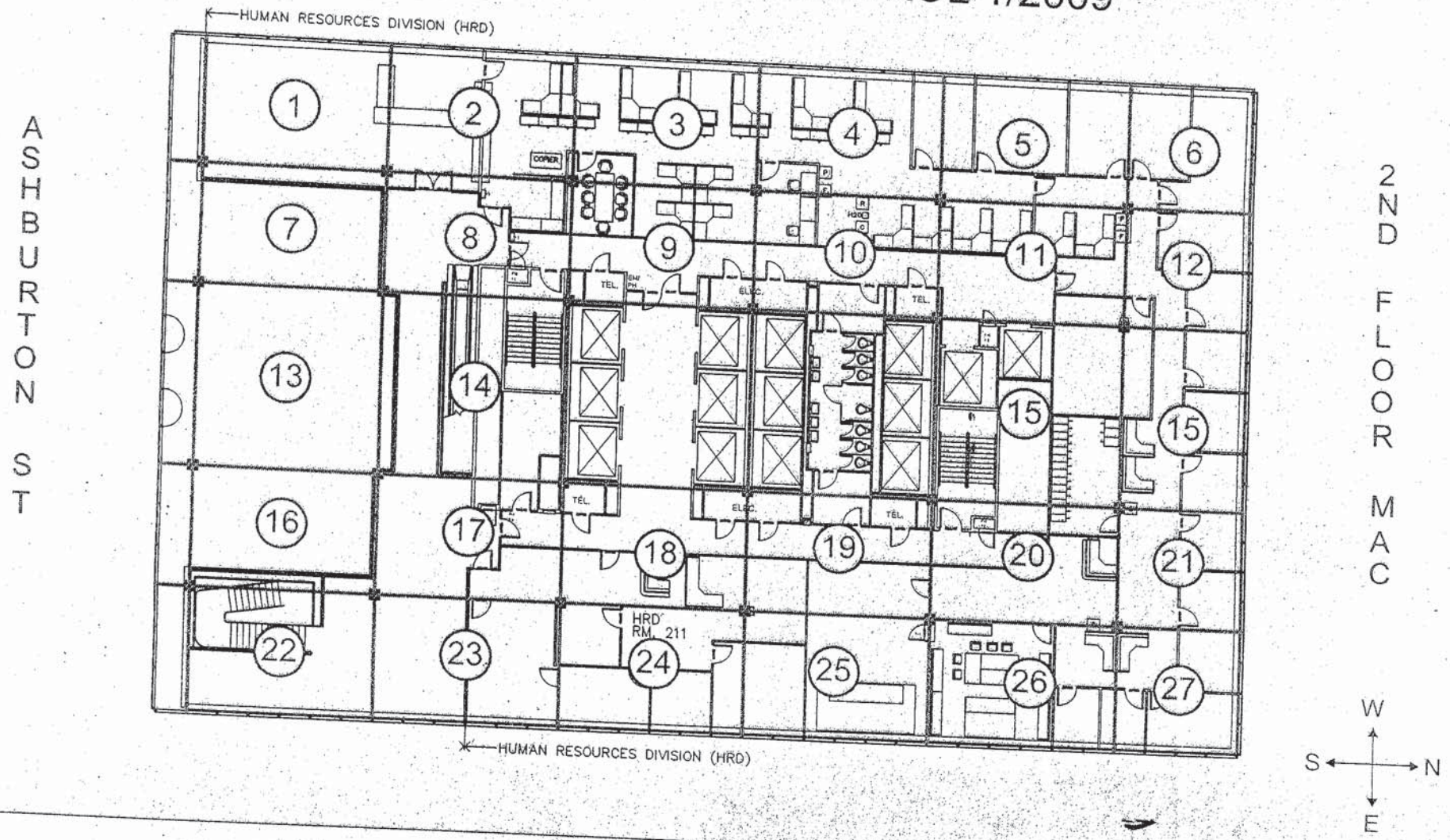
MCCORMACK LIGHTING CONTROL 1/2009



MCCORMACK LIGHTING CONTROL 1/2009



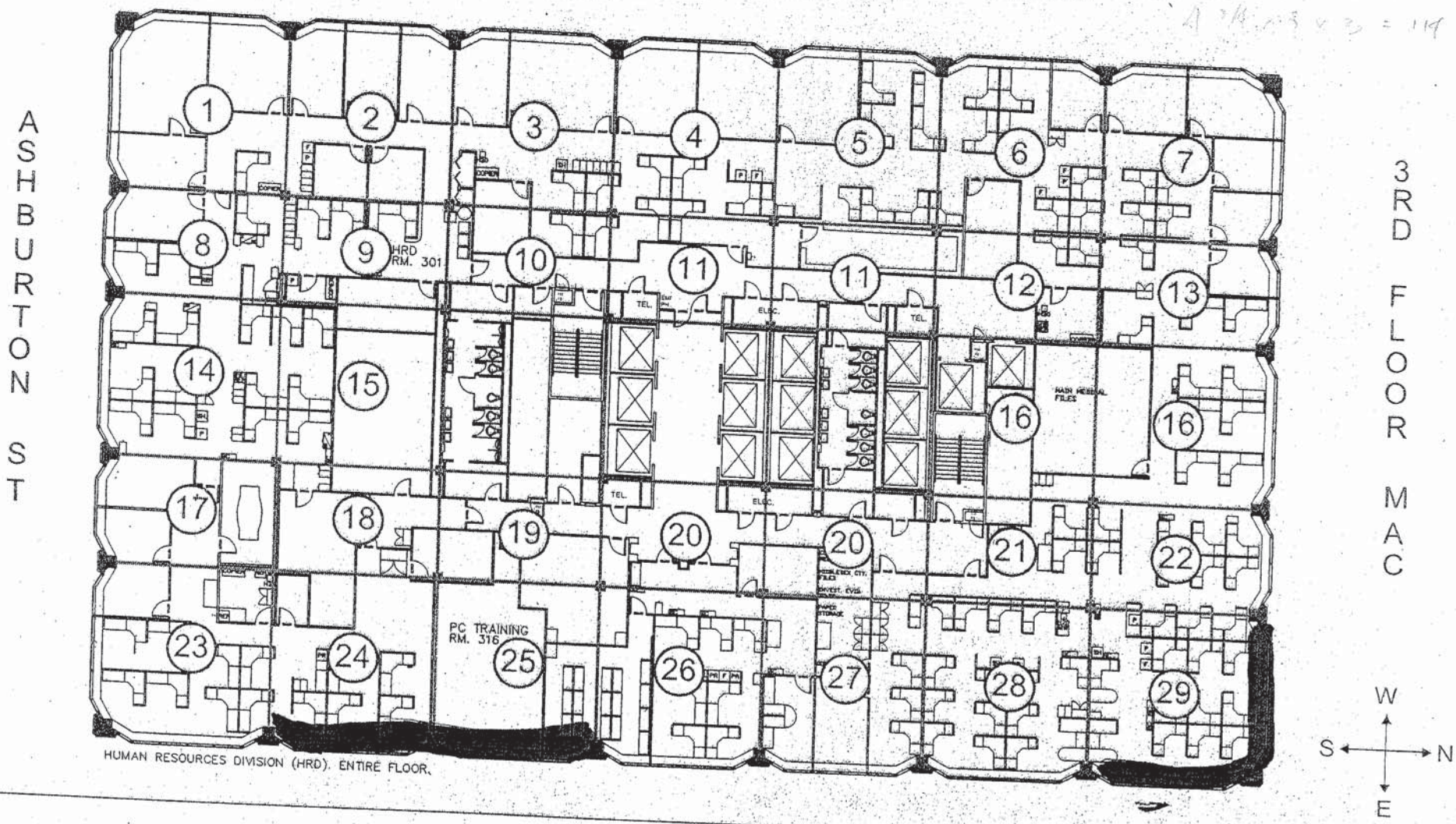
MCCORMACK LIGHTING CONTROL 1/2009



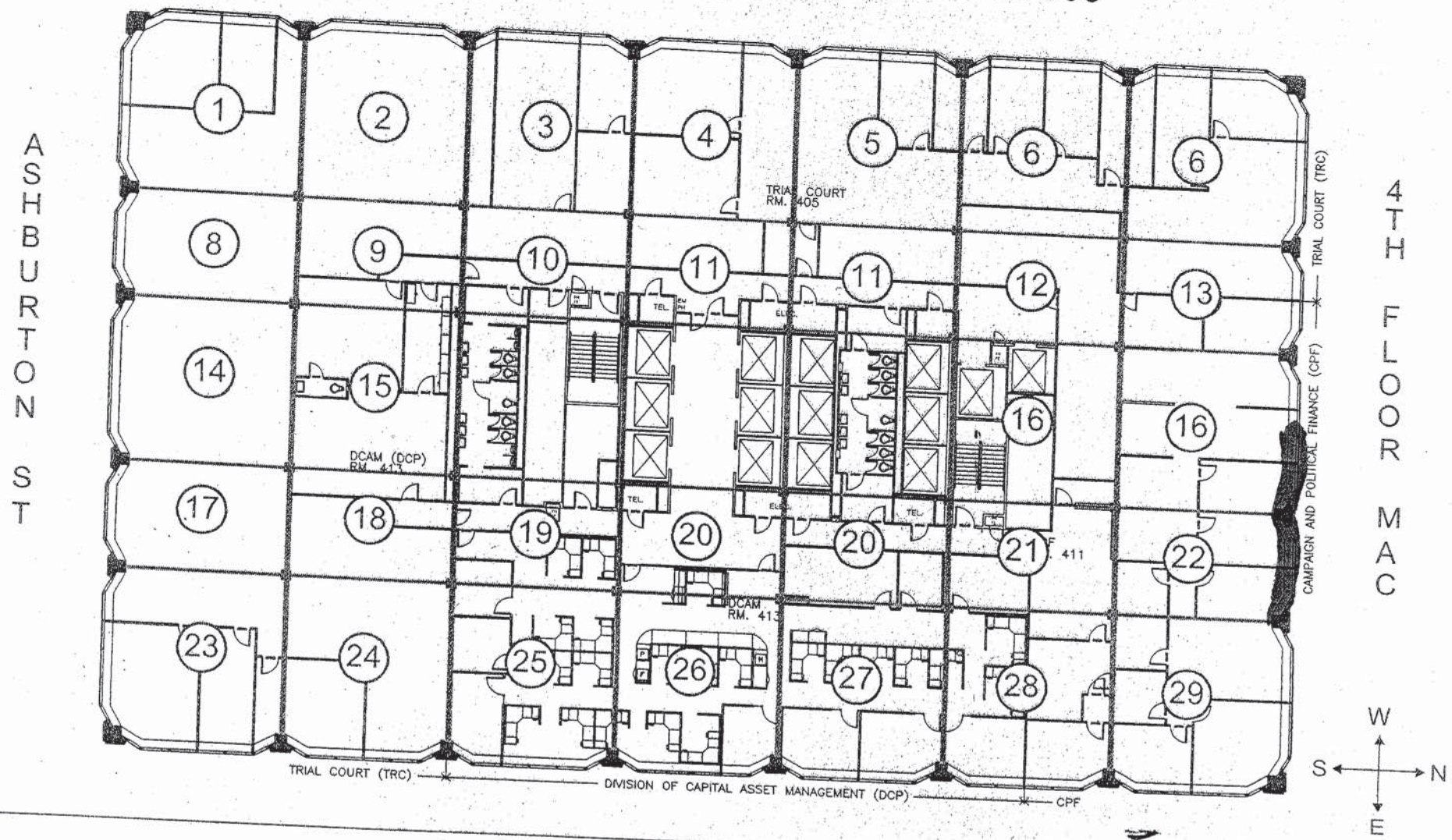
MCCORMACK LIGHTING CONTROL 1/2009

7 3/4 x 8 x 3 = 186

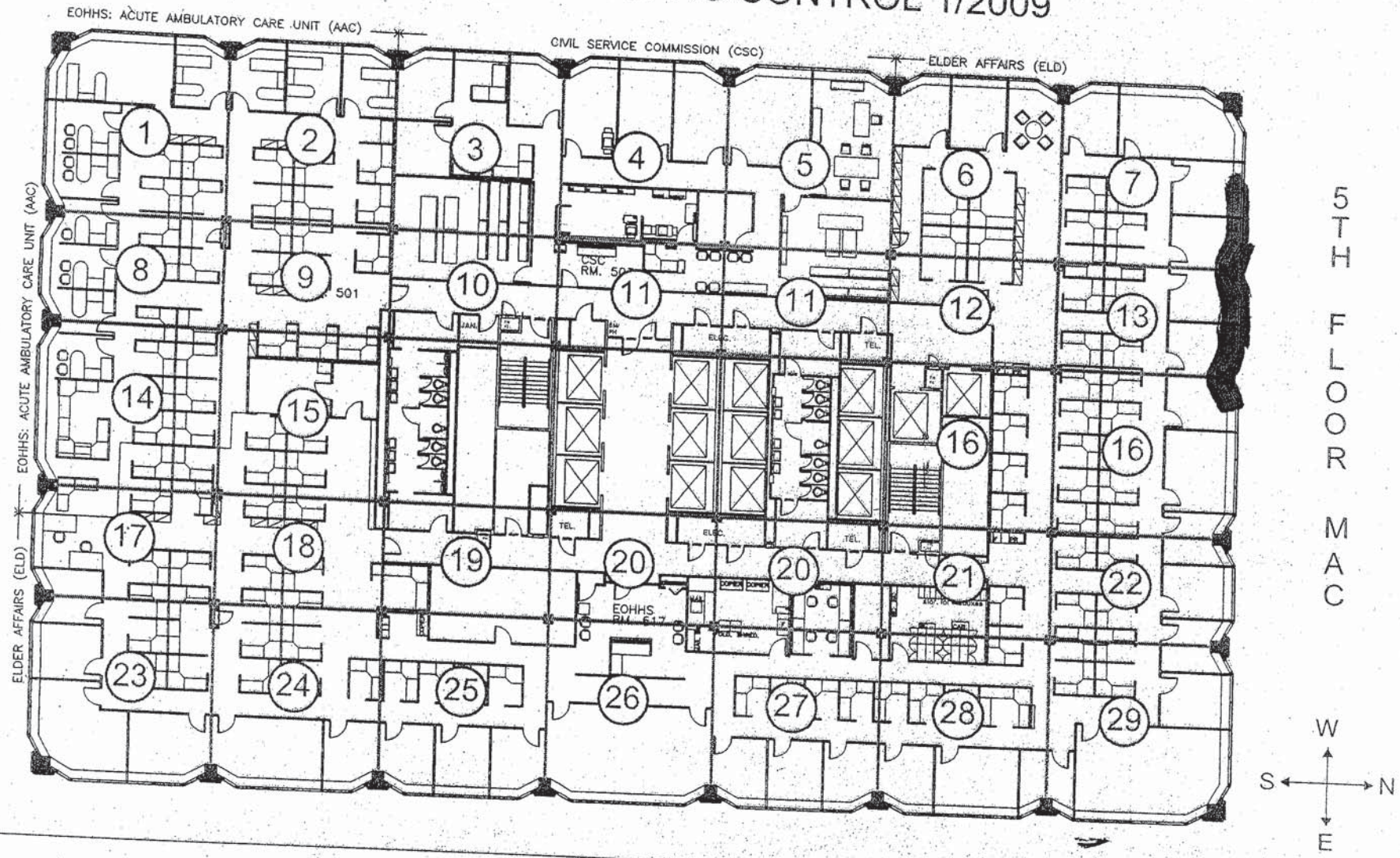
4 3/4 x 8 x 3 = 114



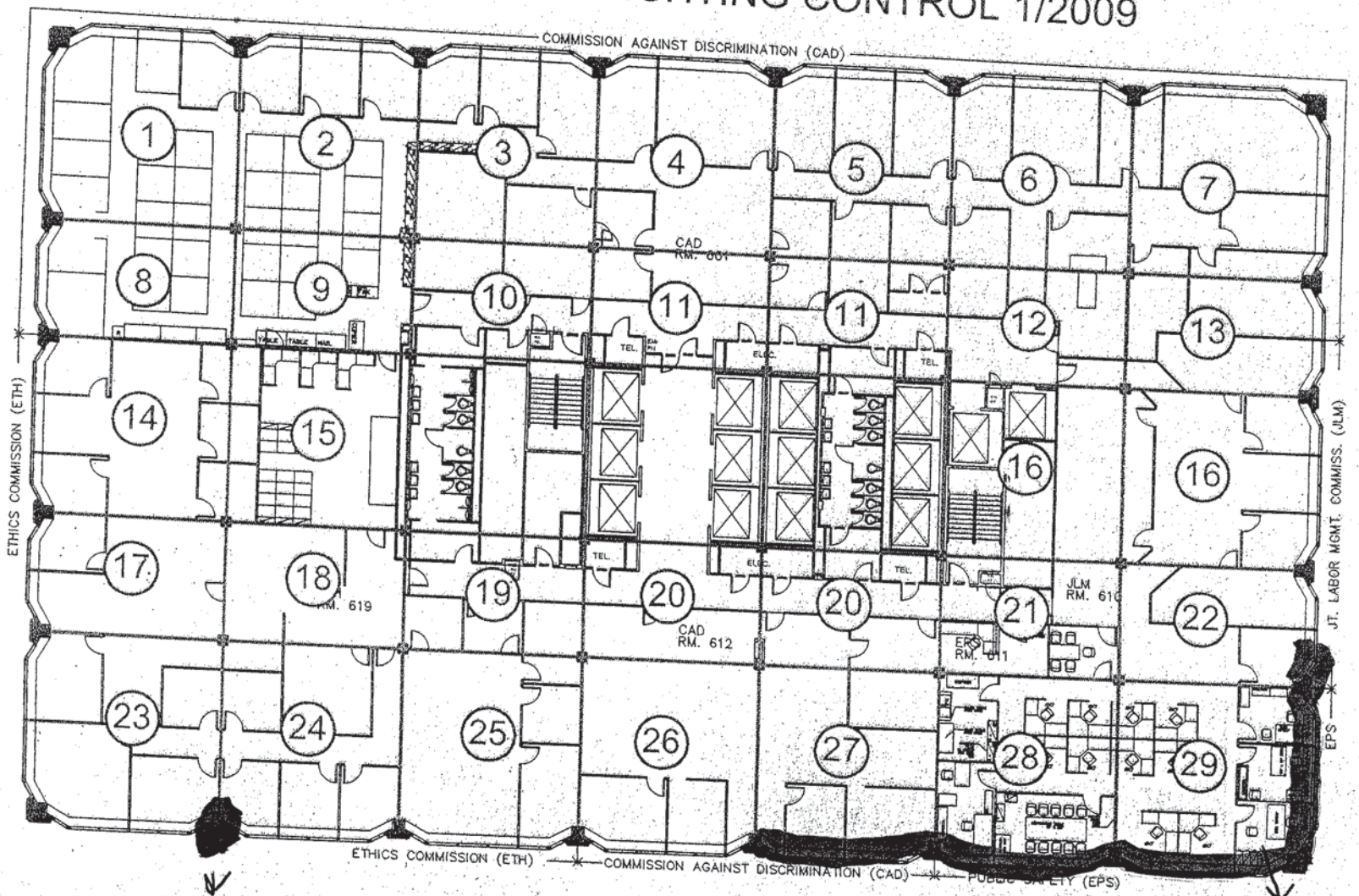
MCCORMACK LIGHTING CONTROL 1/2009



MCCORMACK LIGHTING CONTROL 1/2009



MCCORMACK LIGHTING CONTROL 1/2009

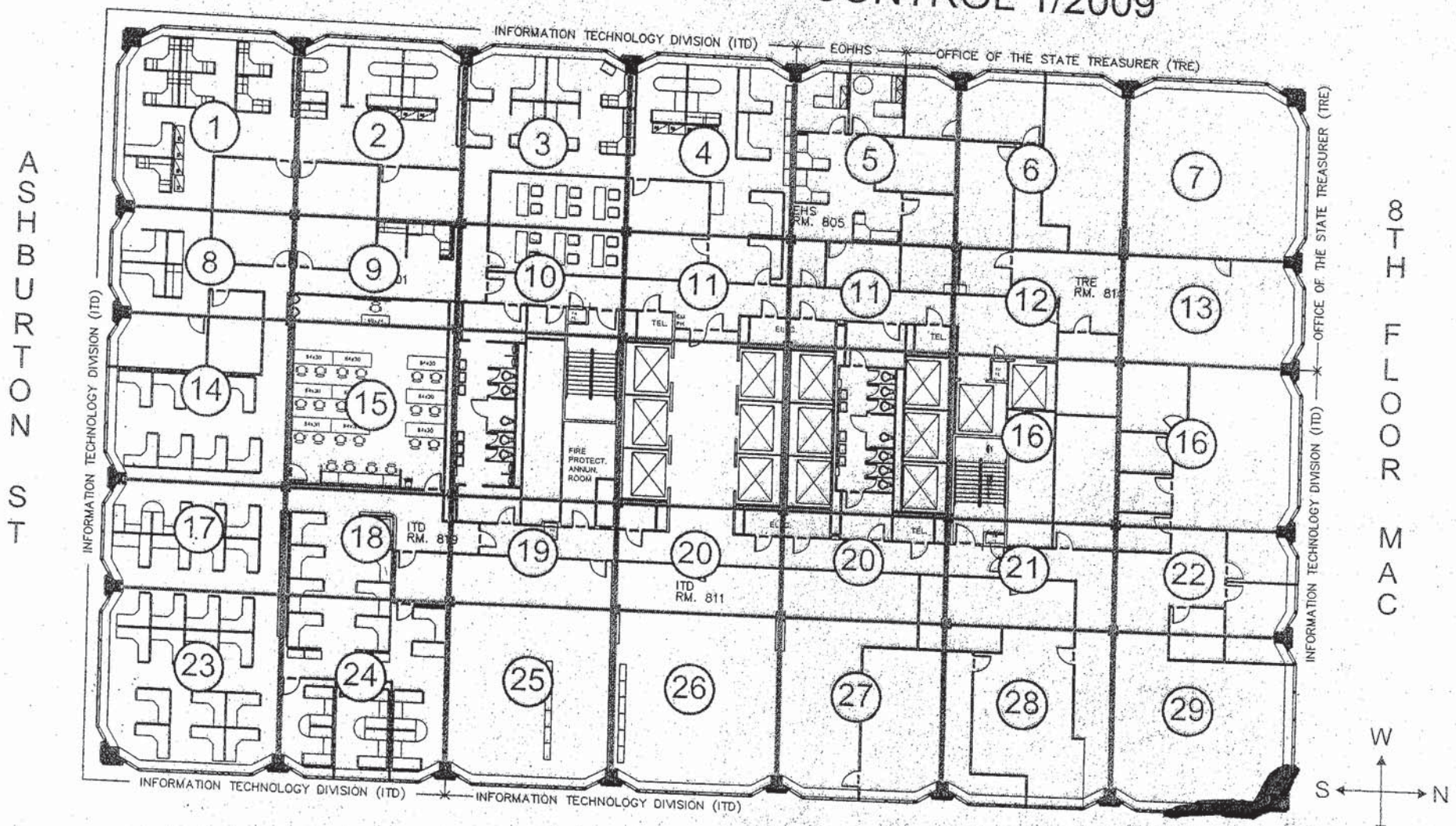


7TH FLOOR

WORSE SECTION SEEN TODAY

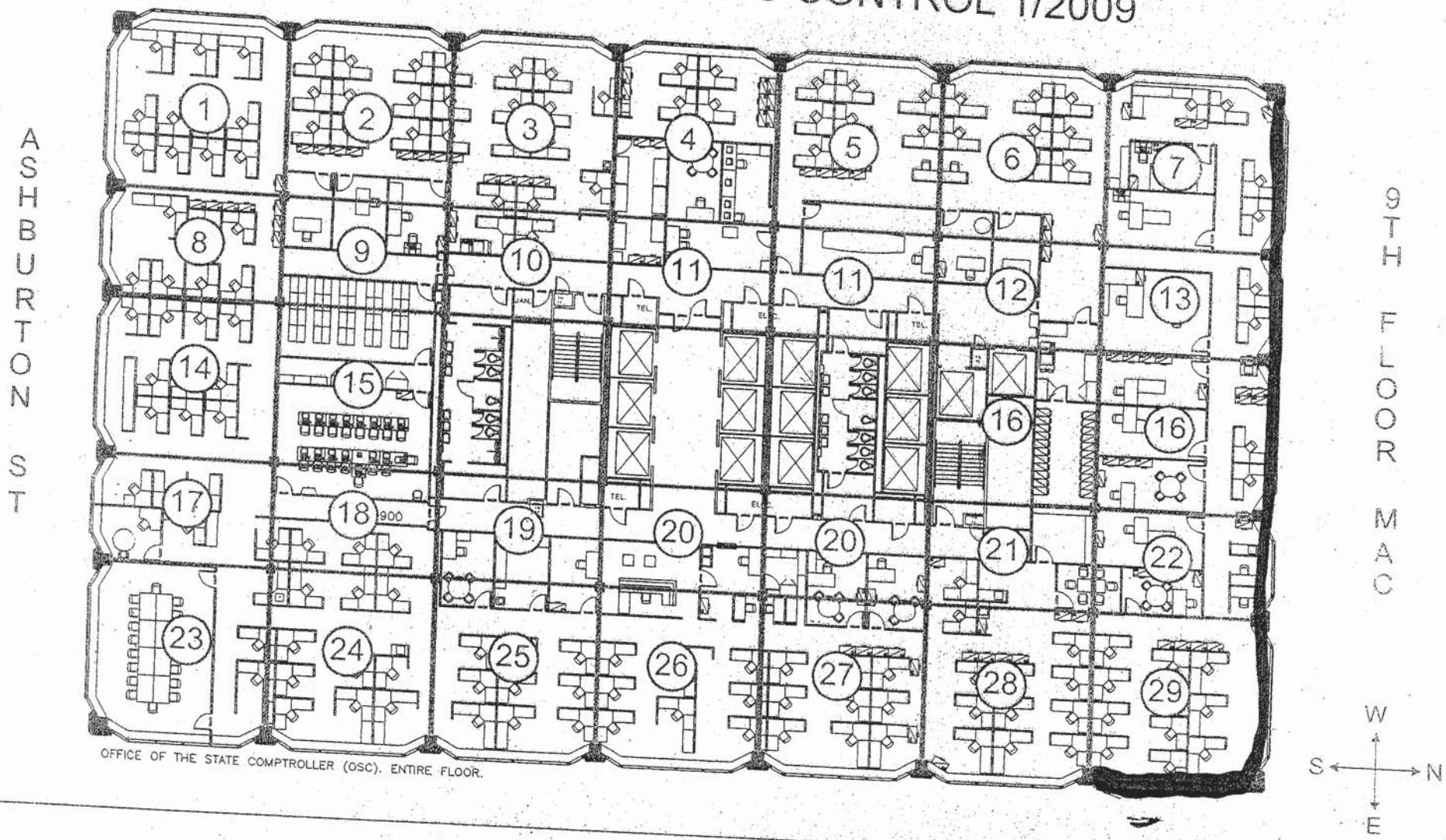
Leaking on THE 7TH FLOOR AS well

MCCORMACK LIGHTING CONTROL 1/2009



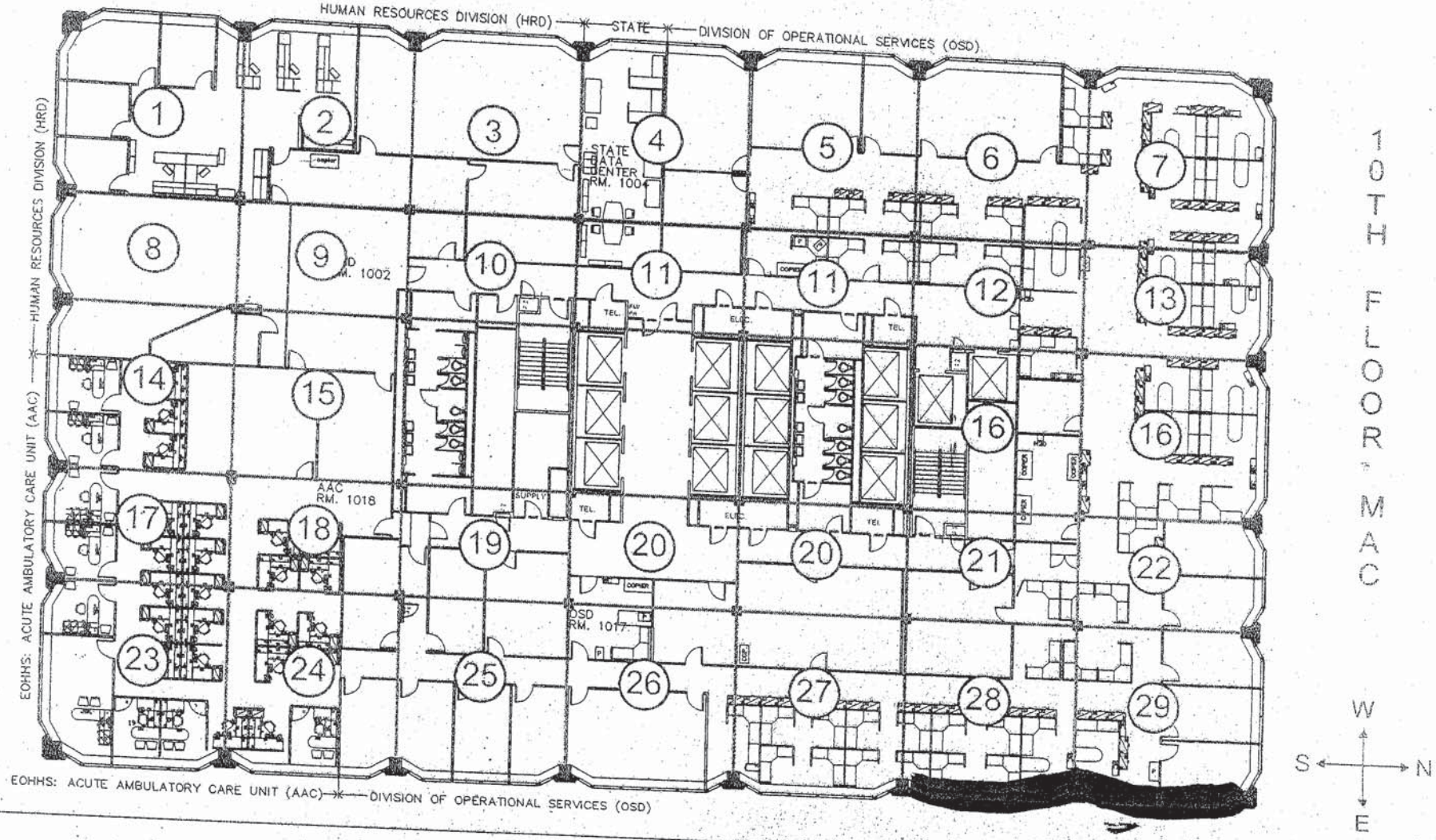
→ very BAD

MCCORMACK LIGHTING CONTROL 1/2009

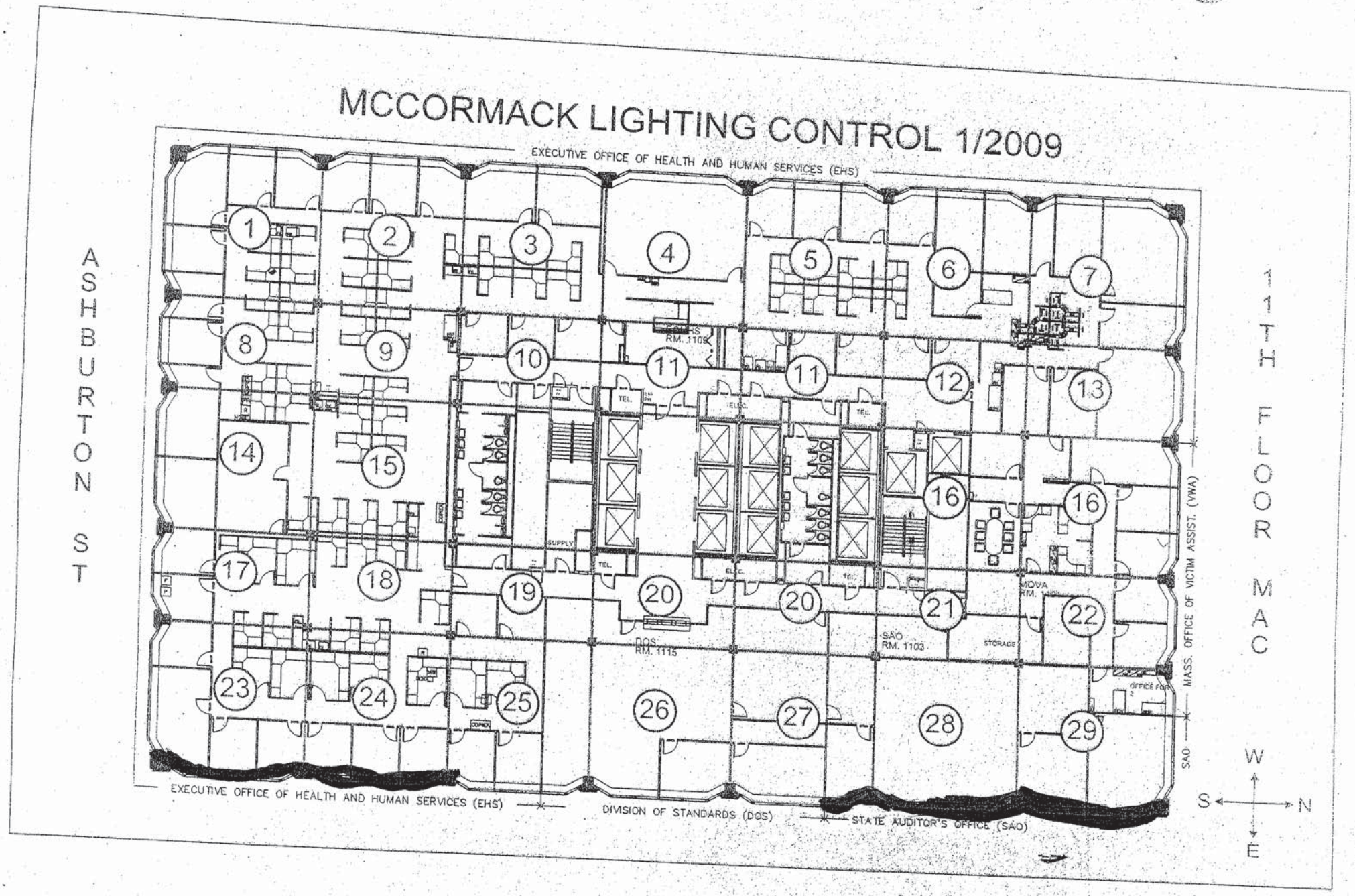


OFFICE OF THE STATE COMPTROLLER (OSC). ENTIRE FLOOR.

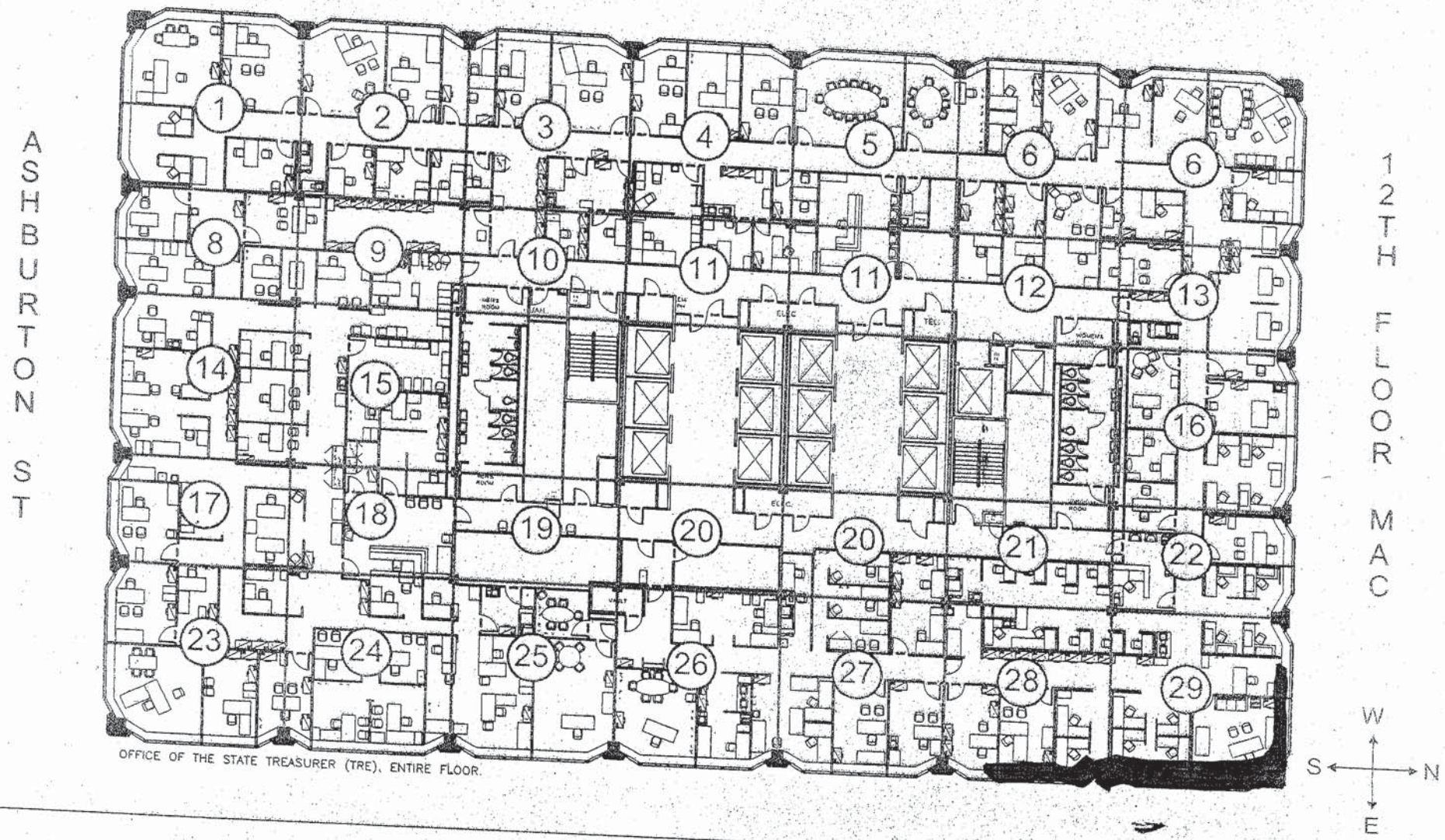
MCCORMACK LIGHTING CONTROL 1/2009



MCCORMACK LIGHTING CONTROL 1/2009

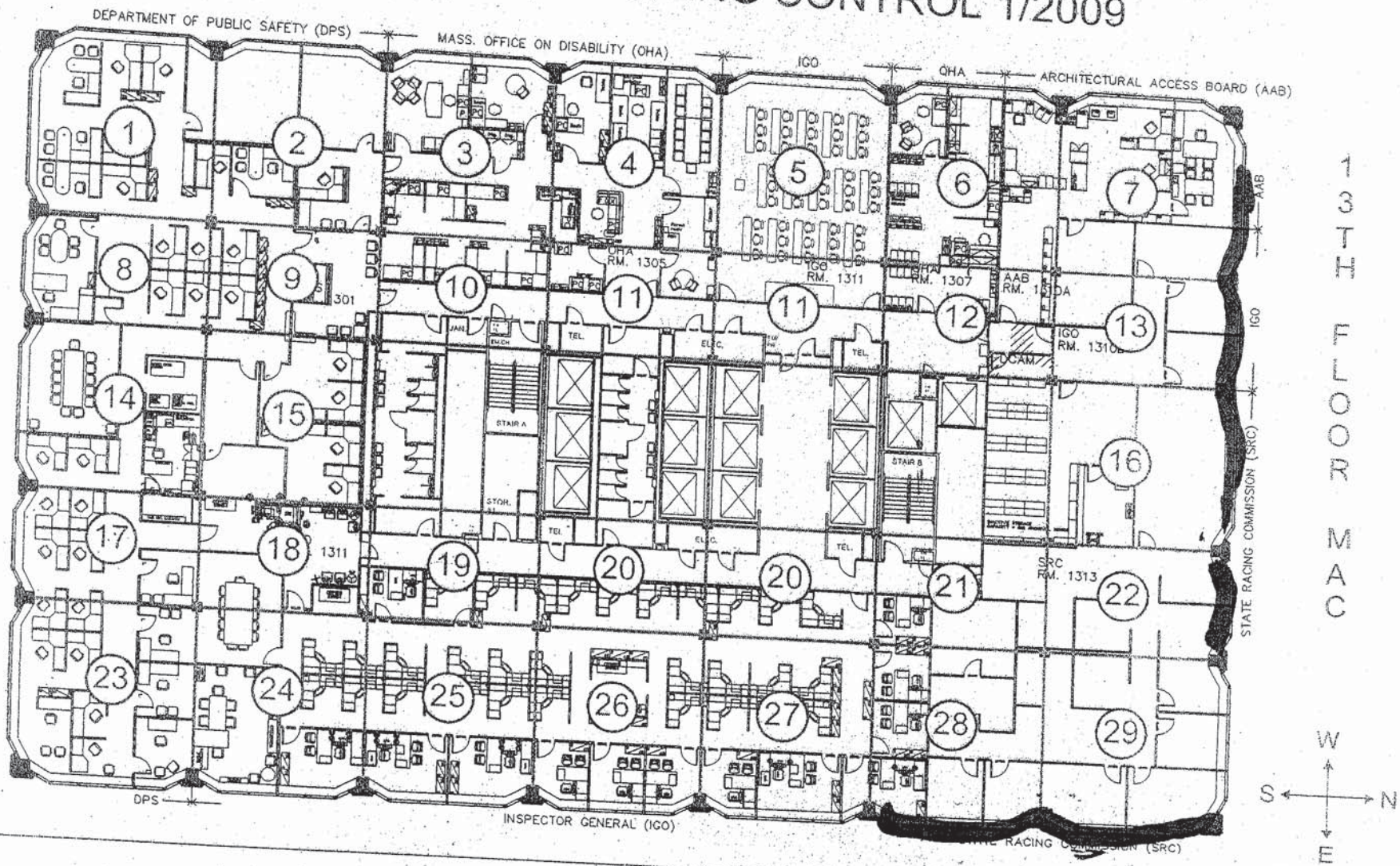


MCCORMACK LIGHTING CONTROL 1/2009

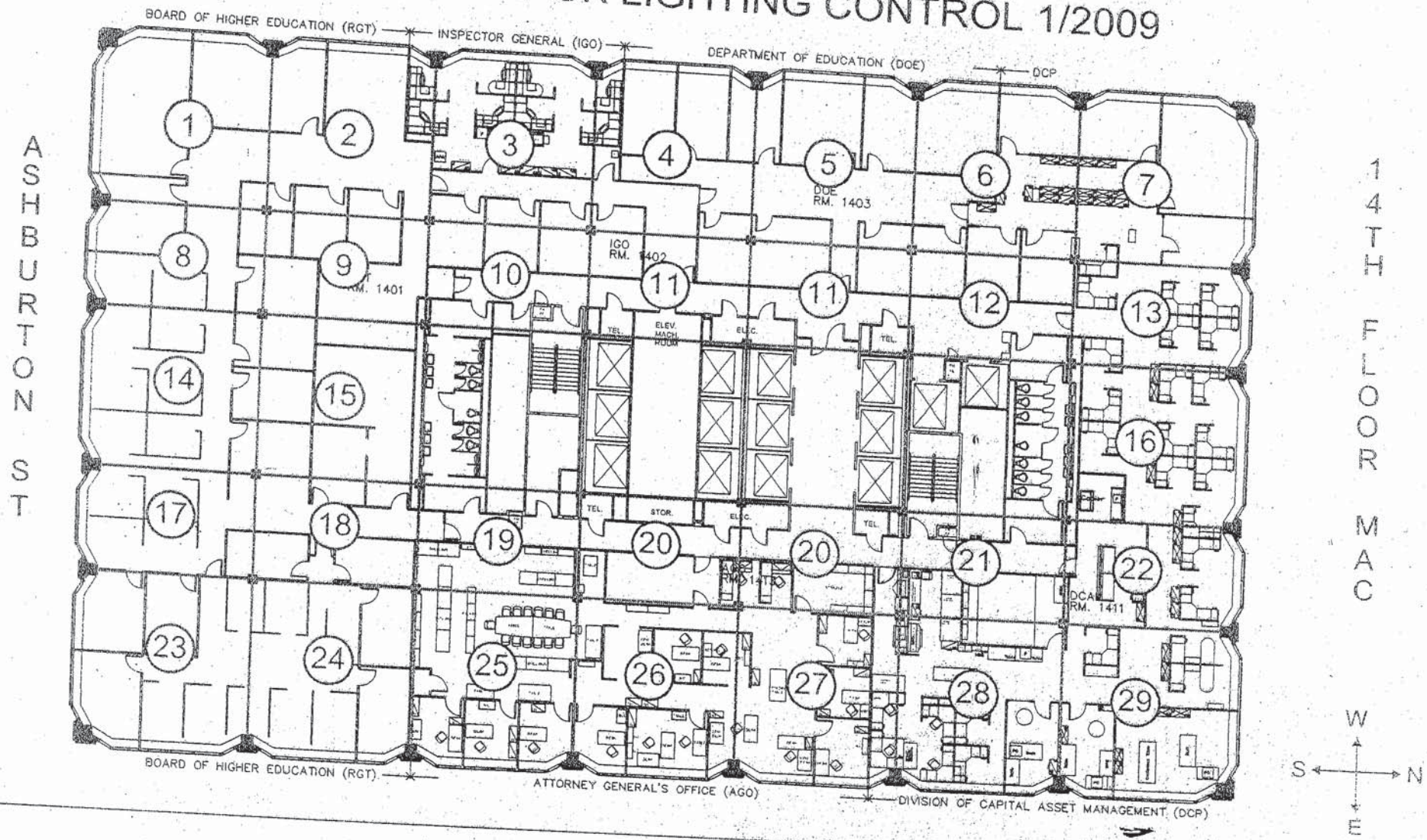


OFFICE OF THE STATE TREASURER (TRE), ENTIRE FLOOR.

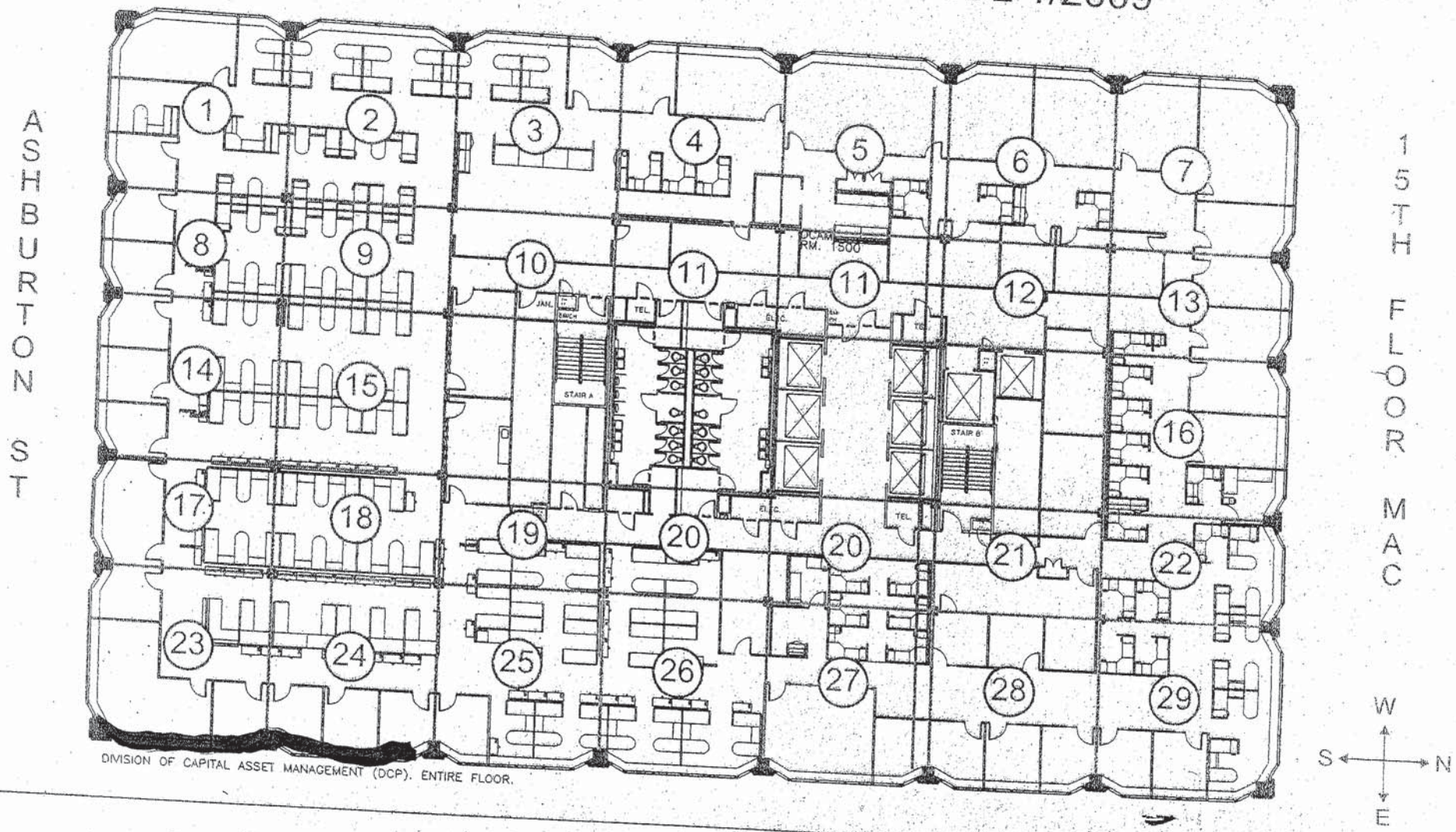
MCCORMACK LIGHTING CONTROL 1/2009



MCCORMACK LIGHTING CONTROL 1/2009

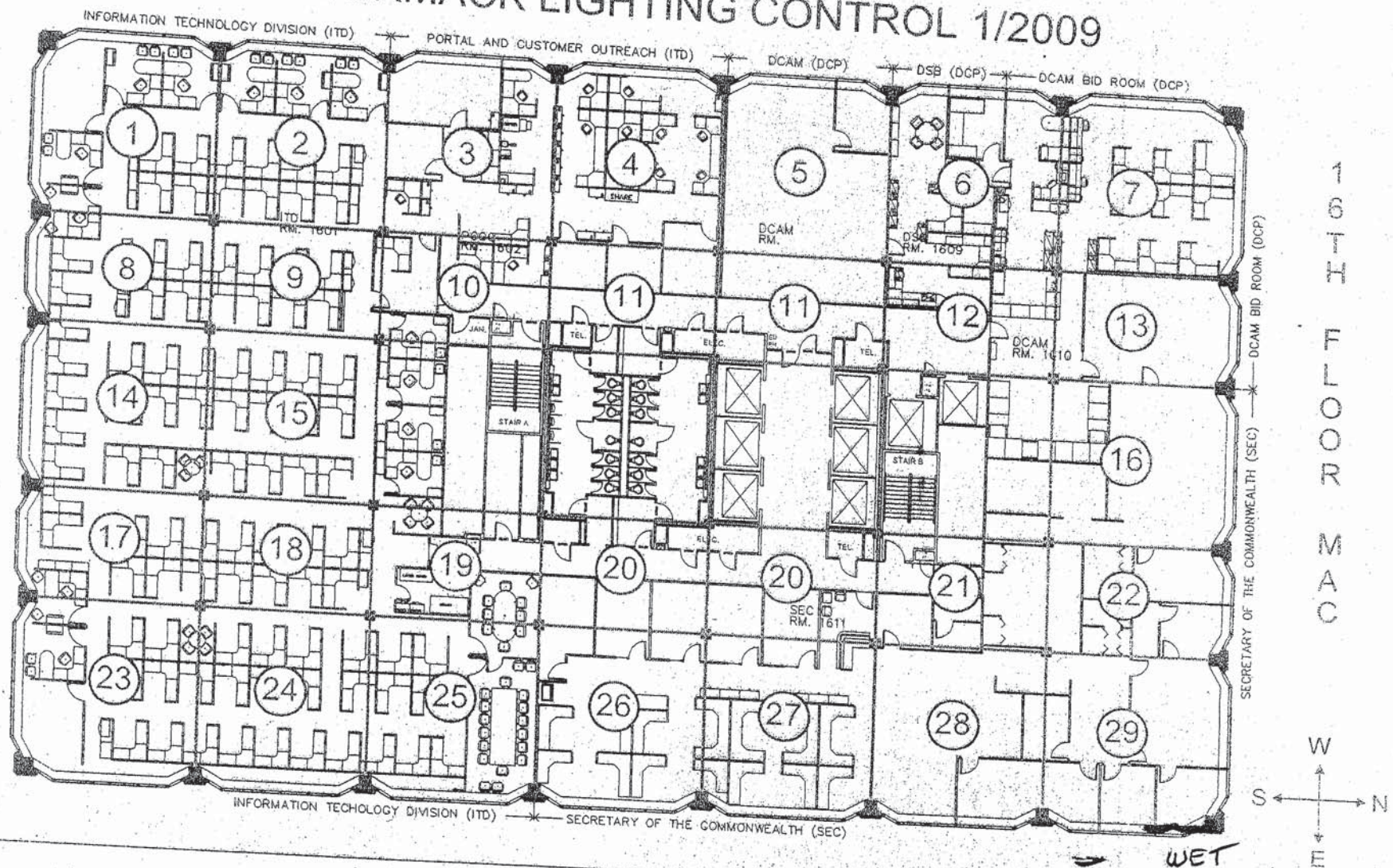


MCCORMACK LIGHTING CONTROL 1/2009



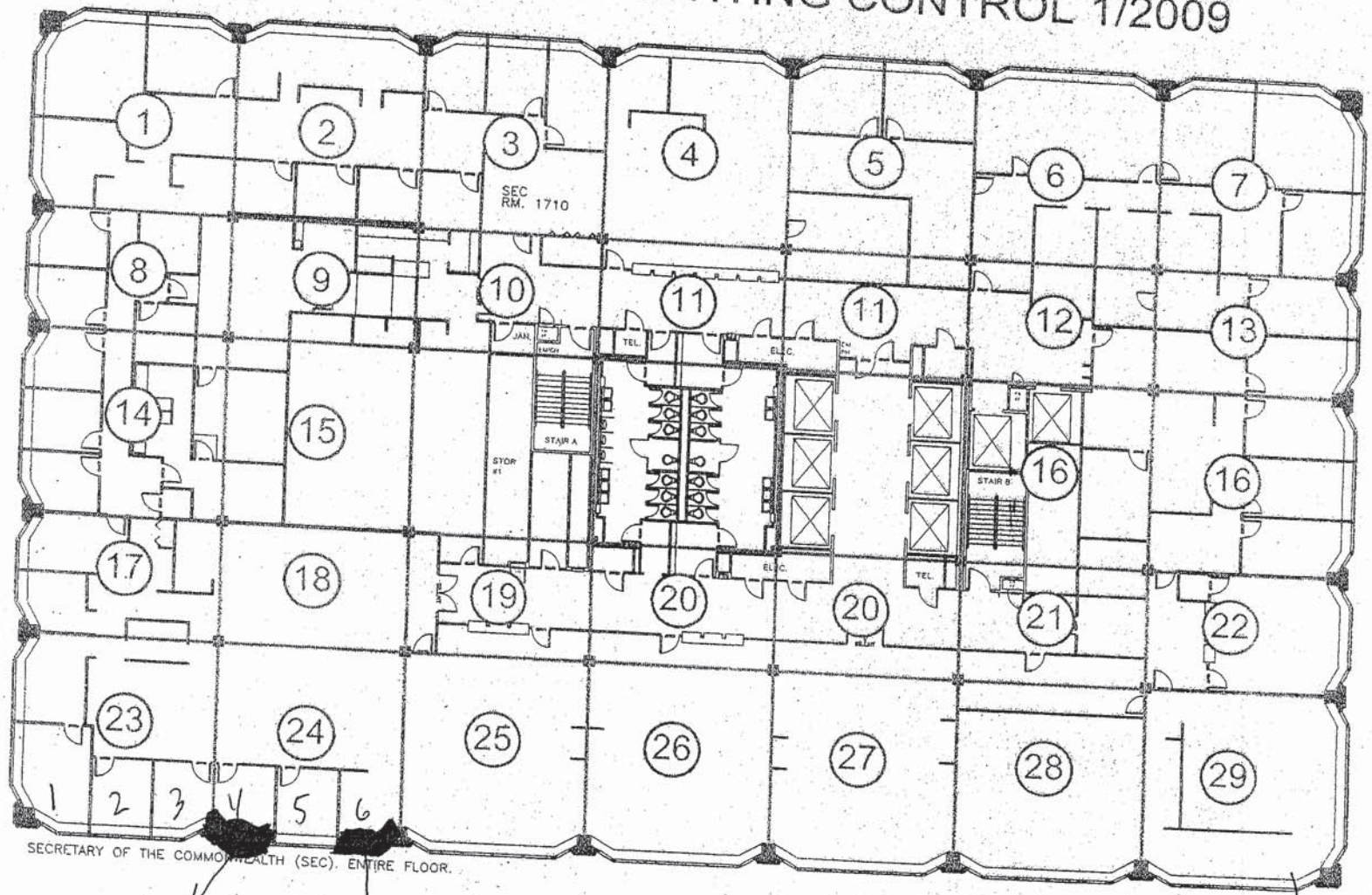
DIVISION OF CAPITAL ASSET MANAGEMENT (DCP). ENTIRE FLOOR.

MCCORMACK LIGHTING CONTROL 1/2009



→ WET
Area was Hydrolic
Cemented in baseboard
Corner. Had chance
take picture. There was

MCCORMACK LIGHTING CONTROL 1/2009



Collin McDonald

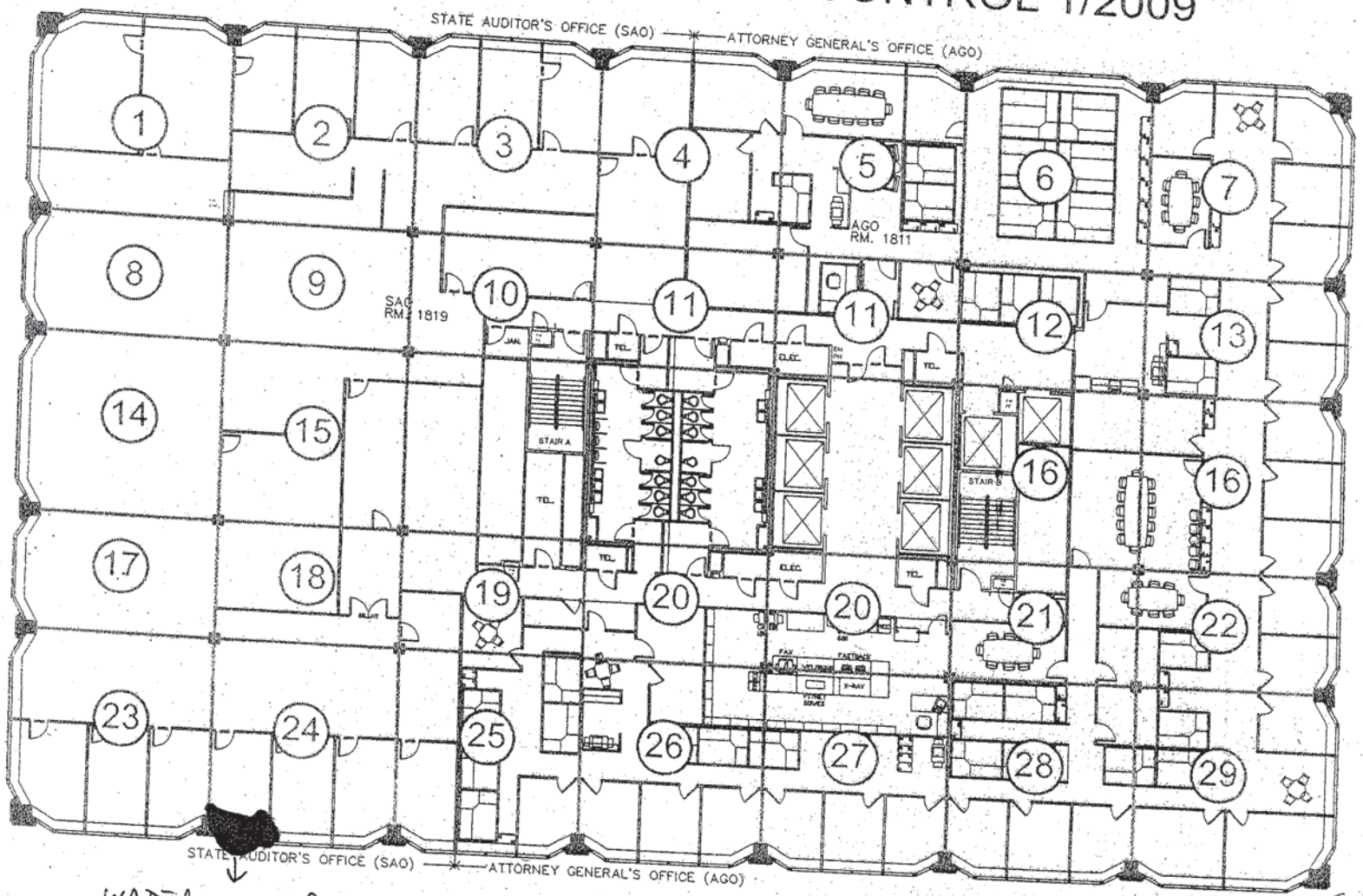
[redacted]

minor she noticed some wet papers

DRY

BUT area was Hydrolk contented

MCCORMACK LIGHTING CONTROL 1/2009



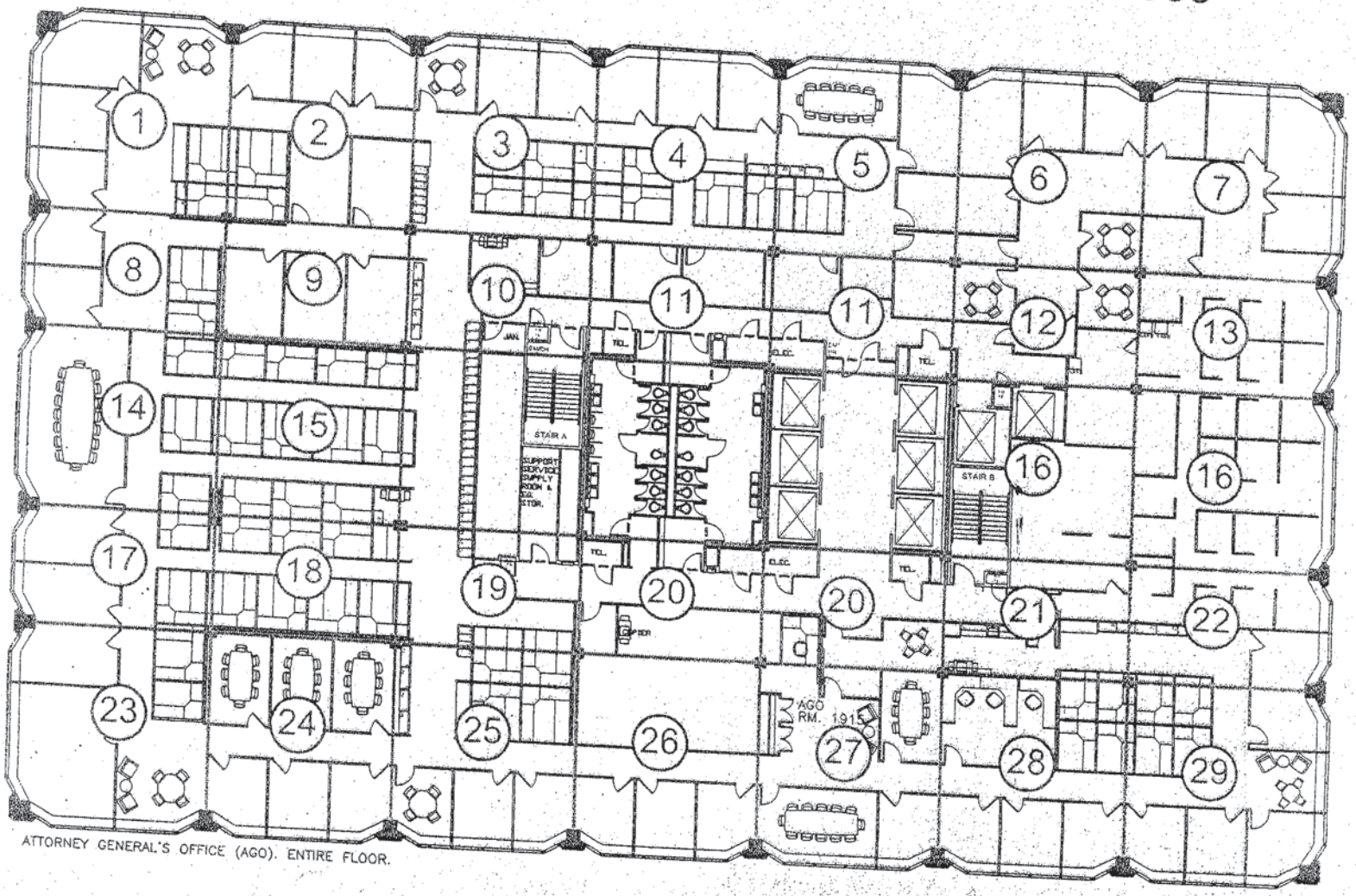
WATER going Down wall

No cleanup needed

19TH 20 DA

DID NOT CHECK

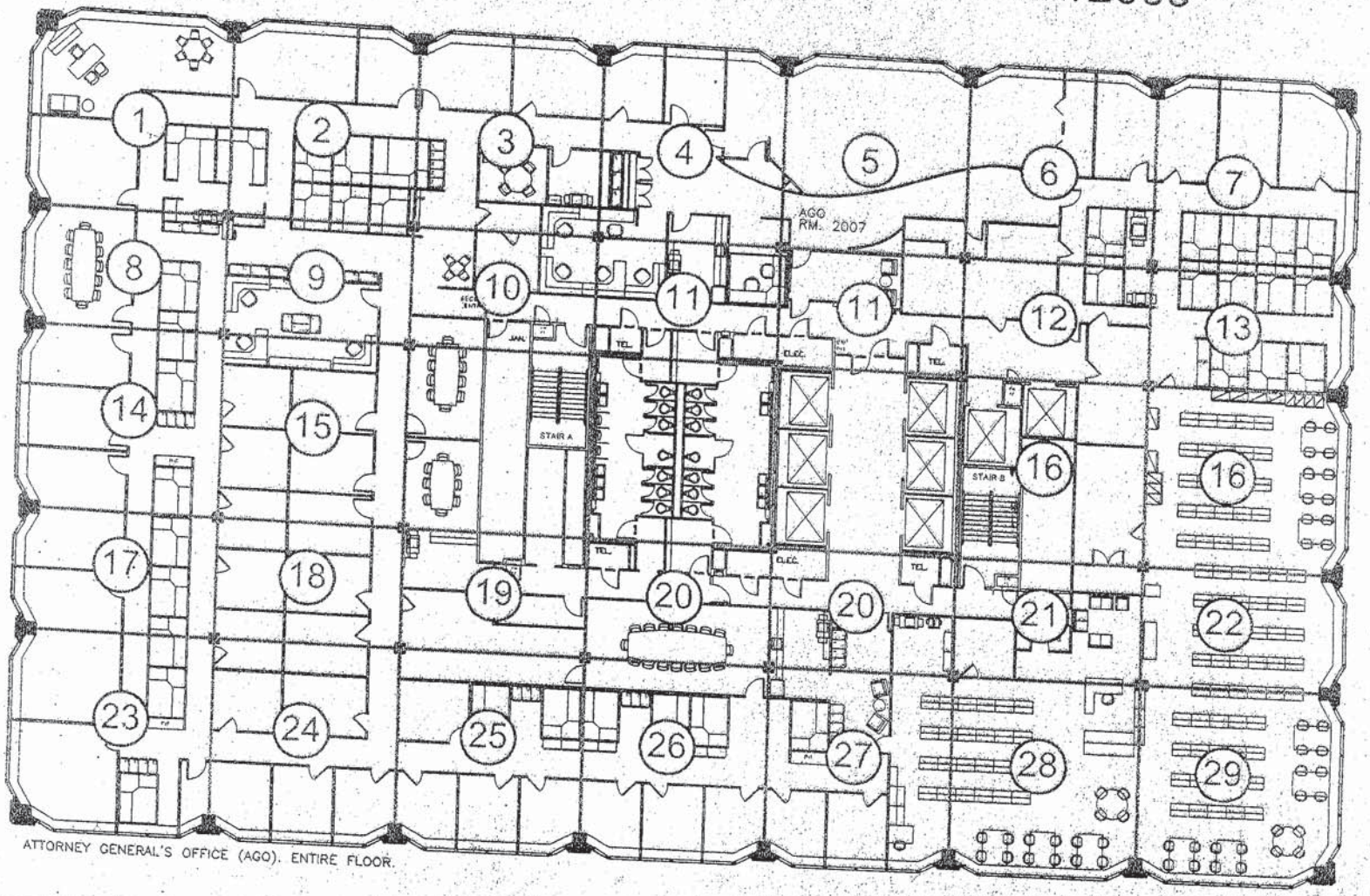
MCCORMACK LIGHTING CONTROL 0/2009



ATTORNEY GENERAL'S OFFICE (AGO). ENTIRE FLOOR.

BSB DID NOT CHECK 3/6

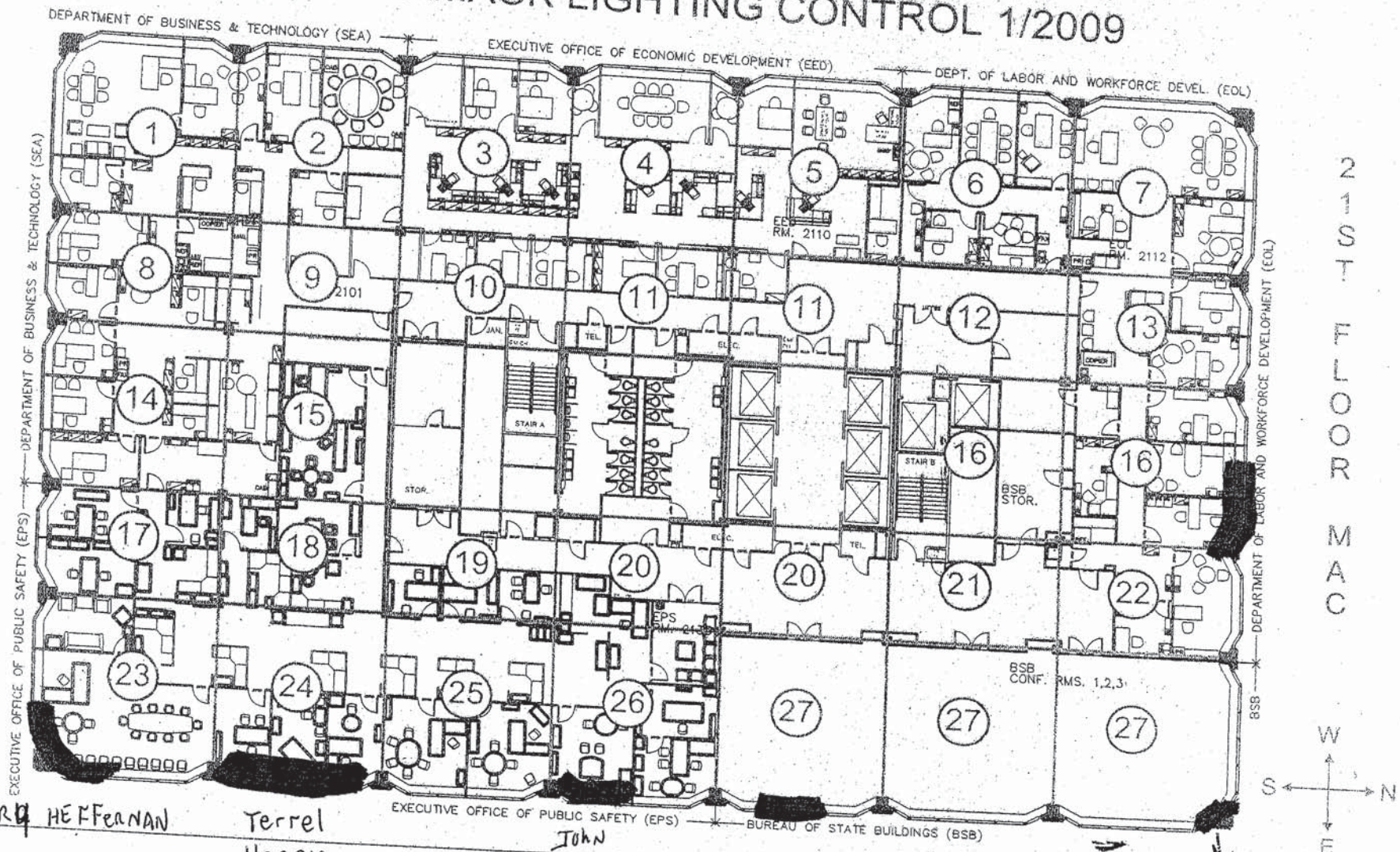
MCCORMACK LIGHTING CONTROL 1/2009



ATTORNEY GENERAL'S OFFICE (AGO). ENTIRE FLOOR.

BSB 010
NOT CHECK
3/16

MCCORMACK LIGHTING CONTROL 1/2009



MARY HEFFERNAN

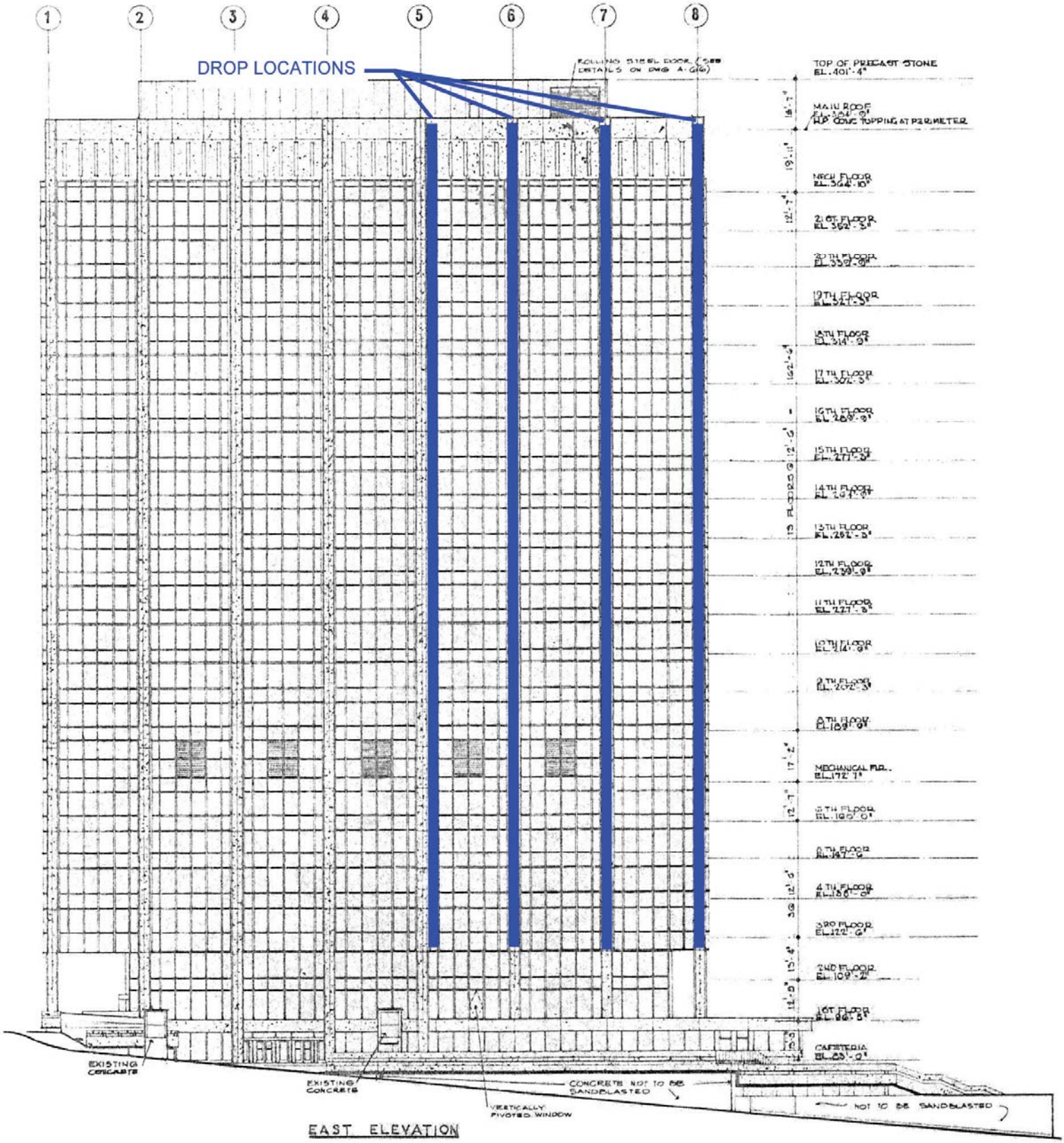
Terrel HARRIS

JOHN grossman

AREA WAS PATCHED WET TO TOUCH

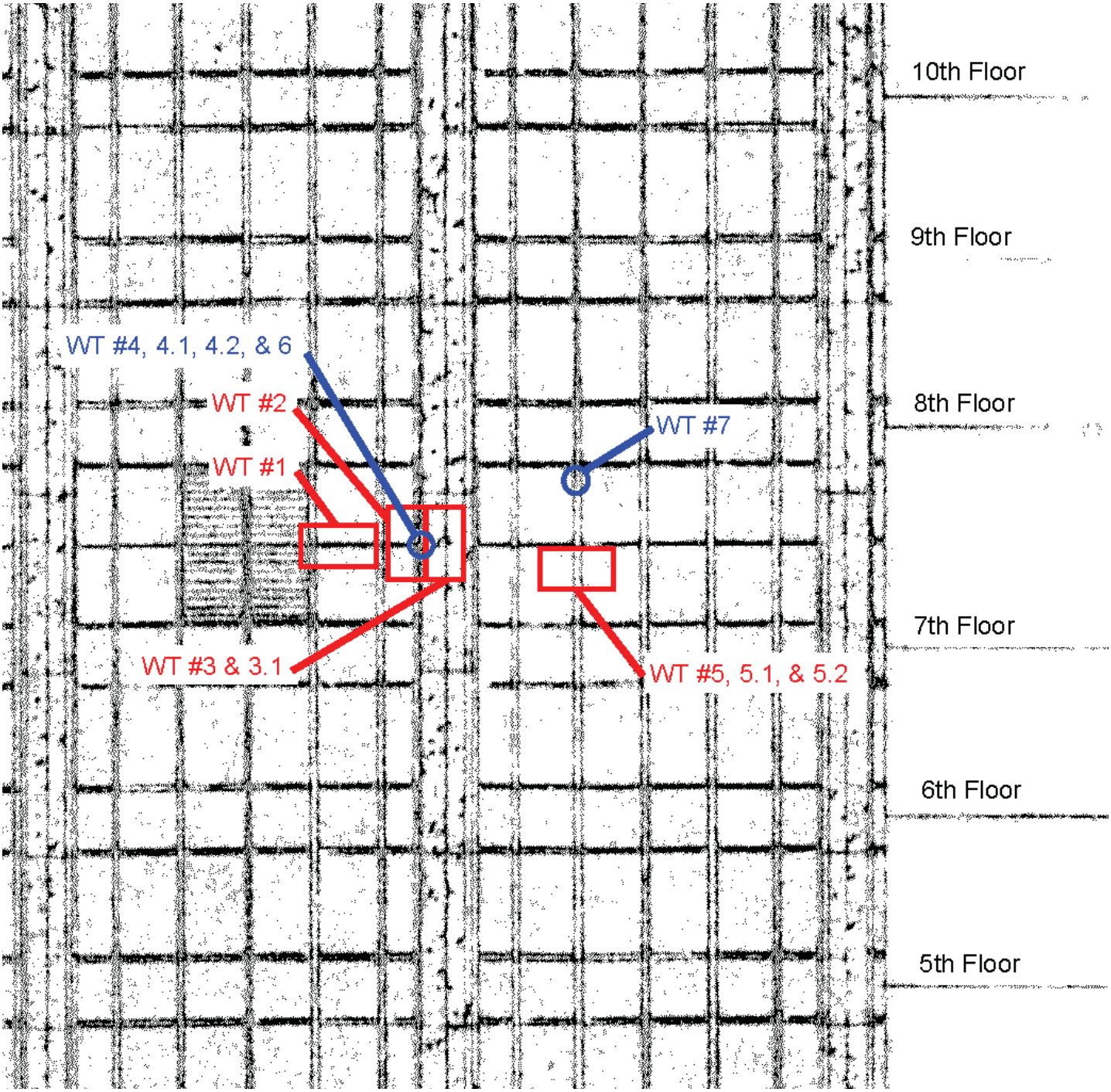
APPENDIX C

Leakage Investigation
John W. McCormack Building
Appendix C- Industrial Rope Access Drop Locations
15 September 2010

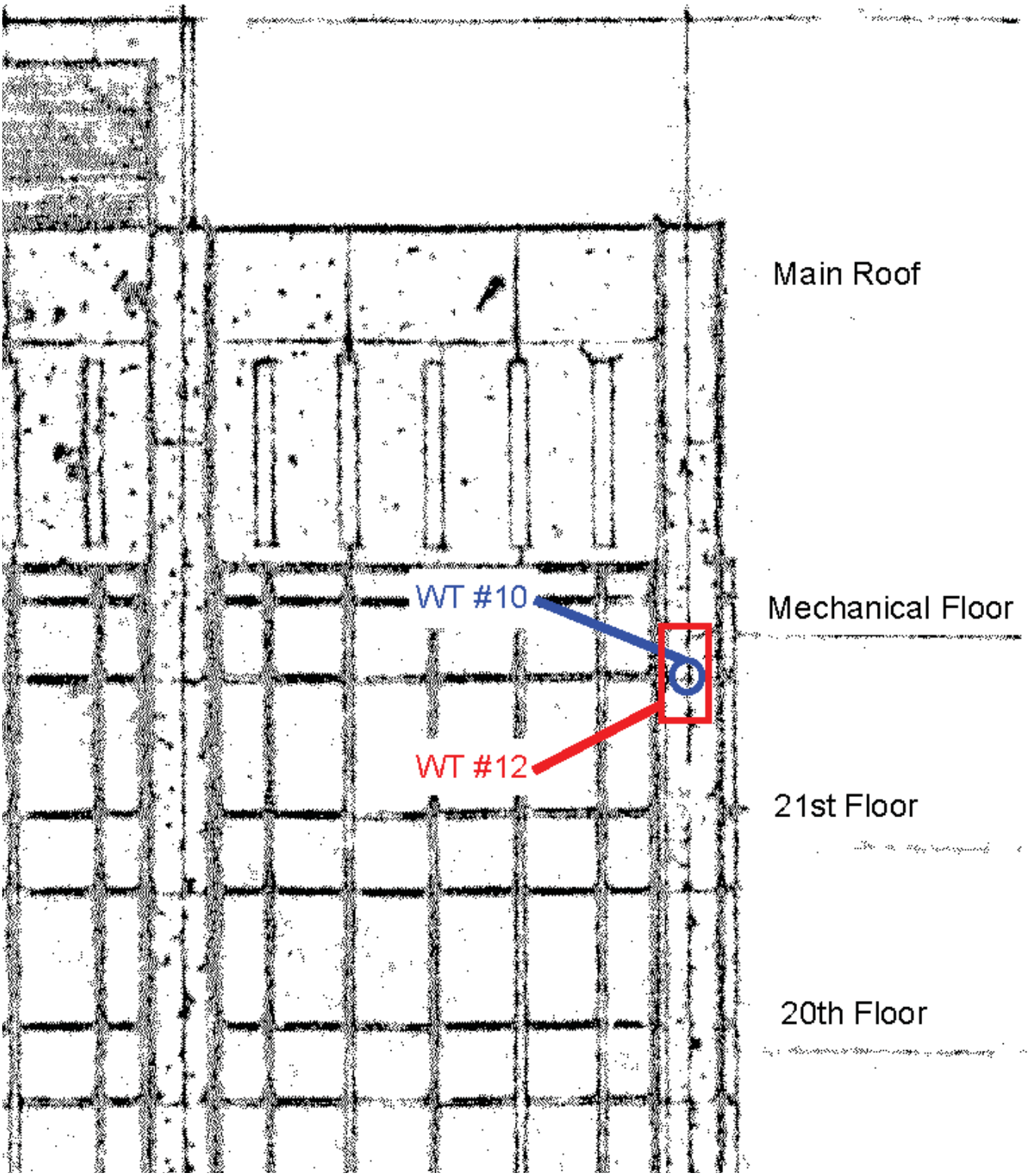


APPENDIX D

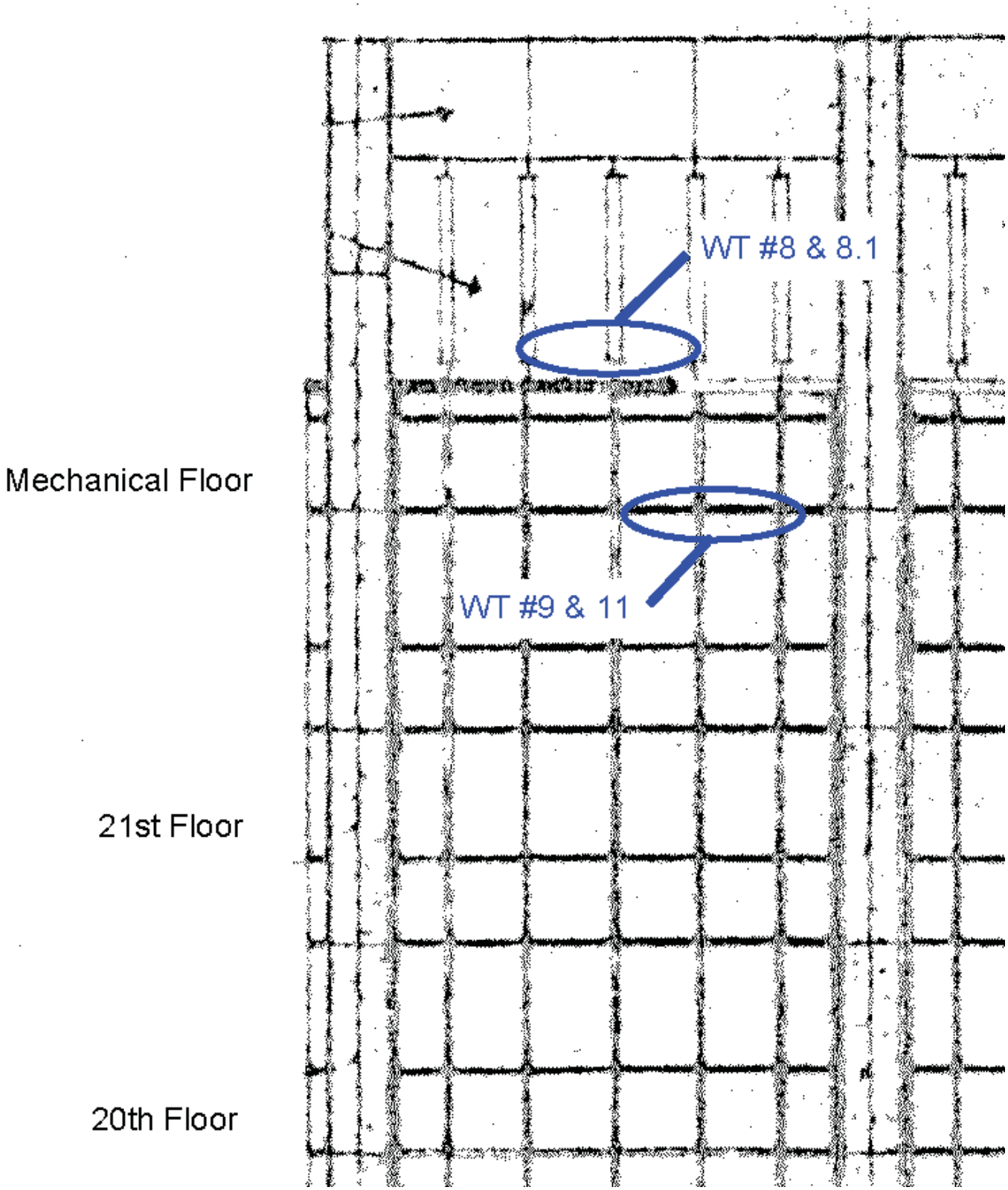
Leakage Investigation
John W. McCormack Building
Appendix D- Water Test Locations
15-17 September 2011 and 1 November 2010
7th Floor, North Corner of East Elevation



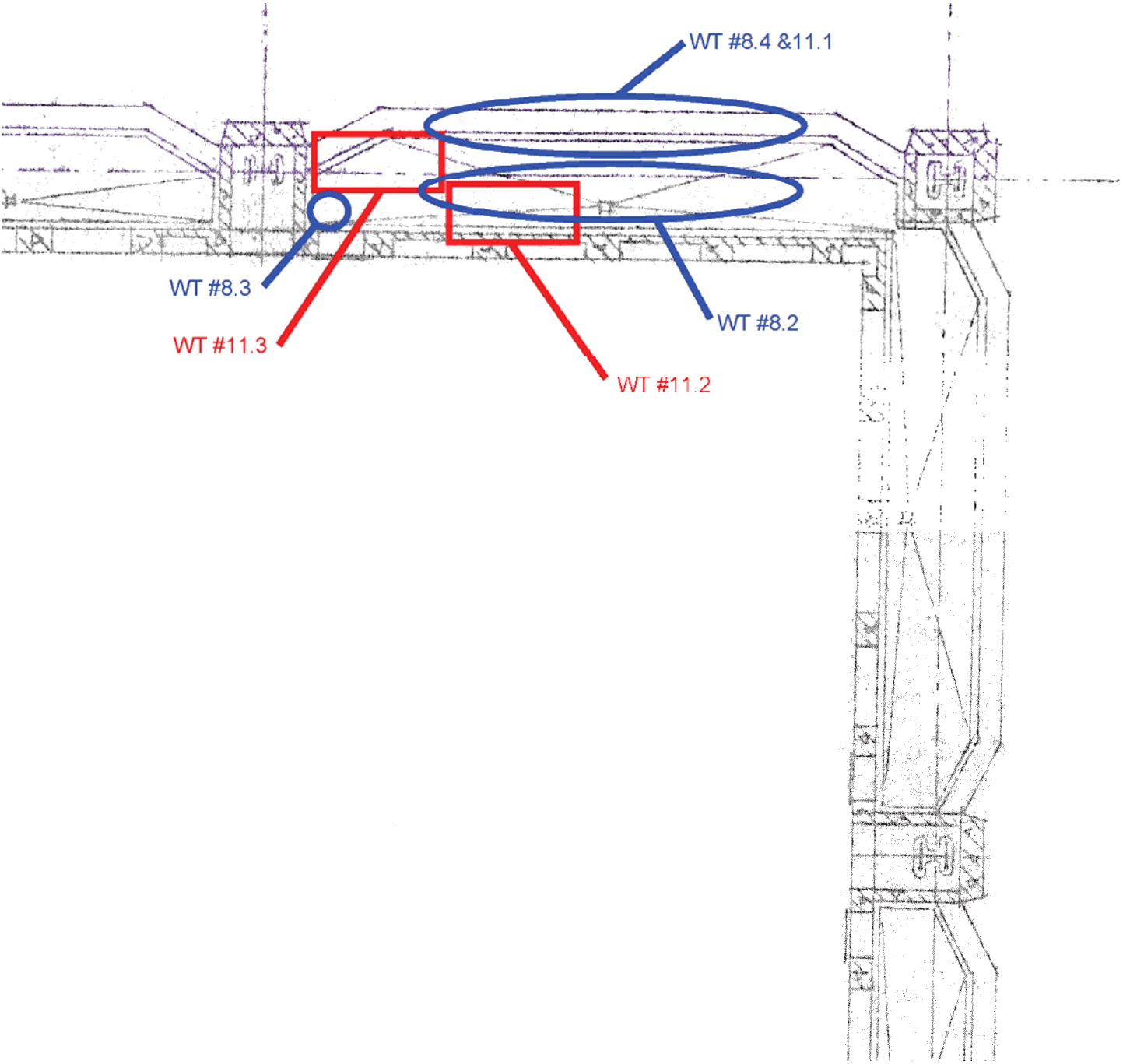
Leakage Investigation
John W. McCormack Building
Appendix D- Water Test Locations
15-17 September 2011 and 1 November 2010
21st Floor, North Corner of East Elevation



Leakage Investigation
John W. McCormack Building
Appendix D- Water Test Locations
15-17 September 2011 and 1 November 2010
21st Floor, East Corner of North Elevation



Leakage Investigation
John W. McCormack Building
Appendix D- Water Test Locations
15-17 September 2011 and 1 November 2010
22nd Floor Balcony, Northeast Corner



SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures

CLIENT AHA Consulting Engineers
SUBJECT John W. McCormack Building
Leakage Investigation

SHEET NO.
PROJECT NO. 100777
DATE
BY RHPriebe
CHECKED BY

Water Testing Matrix 15-17 September 2010 and 1 November 2010

Test Number	Location	Test Type	Test Duration (min)	Leakage Observed	Leakage Description	Comments
1	7th Floor, East Elevation- Horizontal Curtain Wall Mullion	Spray Rack	45	No		No leakage observed on lower floors.
2	7th Floor, East Elevation- Interface between Precast Panel and Curtain Wall Jamb	Spray Rack	30	Yes	Leakaged observed after 15 minutes at jamb frame.	
3	7th Floor, East Elevation- Window Washing Track in Precast Panel	Spray Rack	30	No		Water observed on precast column, but may have resulted from an earlier test.
3.1	7th Floor, East Elevation- Window Washing Track in Precast Panel	Spray Rack	10	Yes	Leakage observed after 5 minutes at horizontal joint between vertical precast panels.	Leakage from Water Test #2 did not occur.
4	7th Floor, East Elevation- Joint in Curtain Wall Jamb	AAMA Nozzle	3	Yes	Same Leakage observed in Water Test #2.	All vertical sealants were taped off.
4.1	7th Floor, East Elevation- Sealant between Precast Panel and Curtain Wall Jamb	AAMA Nozzle	15	No		Removed tape over urethane sealant placed during Water Test #4.
4.2	7th Floor, East Elevation- Vertical Wet Seal at Precast Panel to Curtain Wall Interface	AAMA Nozzle	15	No		All tape from Water Test #4 was removed.
5	7th Floor, East Elevation- Intersection between Vertical and Horizontal Mullion	Spray Rack	20	No		
5.1	7th Floor, East Elevation- Intersection between Vertical and Horizontal Mullion	Static Differential Pressure	20	No		Ran test with differential pressure equal to 1.0 inches of water.
5.2	7th Floor, East Elevation- Intersection between Vertical and Horizontal Mullion	Cyclic Pressure	19	No		Ran test in cycles consisting of 5 minutes of a differential pressure equal to 1.0 inches of water then 1 minute of 0 differential pressure.
6	7th Floor, East Elevation- Sealant between Precast Panel and Curtain Wall Jamb	AAMA Nozzle	30	No		Follow up to Water Test #4.1
7	7th Floor, East Elevation- Sealant at Pressure Bar in Vertical Mullion	AAMA Nozzle	15	No		
8	22nd Floor, North Elevation, Balcony above Conference Room 3- Counter Flashing on Rising Wall	AAMA Nozzle	15	No		
8.1	22nd Floor, North Elevation, Balcony above Conference Room 3- Vertical Precast Sealant Joint on Rising Wall	AAMA Nozzle	15	No		
8.2	22nd Floor, North Elevation, Balcony above Conference Room 3- Light Fixture and Other Penetrations	AAMA Nozzle	10	No		
8.3	22nd Floor, North Elevation, Balcony above Conference Room 3- Vertical Termination Bar at West Corner	AAMA Nozzle	20	No		
8.4	22nd Floor, North Elevation, Balcony above Conference Room 3- Metal Coping Joints	AAMA Nozzle	35	No		Each joint was sprayed for approximately 10 minutes.
9	21st Floor, North Elevation, Conference Room 3- Curtain Wall Mullions	AAMA Nozzle	20	No		Test started at the sill and then progressed to the joint in the vertical mullion
10	21st Floor, East Elevation, Conference Room 3- Joint in Window-Washing Track	AAMA Nozzle	25	No		
11	21st Floor, North Elevation, Conference Room 3- Curtain Wall Mullions	Spray Rack	70	No		
11.1	22nd Floor, North Elevation, Balcony above Conference Room 3- Metal Coping on Parapet	Spray Rack	85	No		
11.2	22nd Floor, North Elevation, Balcony above Conference Room 3- Rising Wall	Spray Rack	30	No		
11.3	22nd Floor, North Elevation, Balcony above Conference Room 3- West Corner of Parapet	Spray Rack	60	Yes	Leakage observed on beam above ceiling panels.	
12	21st Floor, East Elevation, Conference Room 3- Joint in Window-Washing Track	Spray Rack	180	Yes	Leakage observed at the horizontal jonit between vertical precast panels on multiple floors.	