



August 17, 2018

To: Board of Directors
Tower House Condominium Association
5500 Collins Avenue
Miami Beach, Florida 33140

As per the request of the Association of the TowerHouse Condominium our firm has evaluated the current balcony railing system along with two (2) other proposed FL Building code compliant options for new railing systems. The following recommendations were based on a visual evaluation of the existing system and the installation means, methods, maintenance, weight load, longevity, and warranty of the proposed systems.

1. **Existing Pre-cast Baluster Railing System:** Non-code compliant as to height, spacing of vertical elements and maximum height off finished floor. The old concrete railings are in an advanced stage of deterioration with falling concrete visible on inspection. A prior survey performed in Spring 2018 indicated at least 64% of the balusters were in need of immediate replacement. A recent survey indicated additional deterioration in excess of the former estimate. Due to the quantity of balusters in need of full replacement, the non-code compliant nature of the existing design and the inability to perform replacements of the existing balusters as per the FL Building code, it is not feasible, from an engineering standpoint, to maintain the existing railing system, which must be brought up to code as part of the major concrete restoration program being undertaken by the Association..
2. **New Pre-Cast Concrete Baluster System:** This railing system consists of two major components which comprise the overall railing assembly: a Pre-Cast Concrete Top Handrail and Pre-Cast Concrete Vertical Balusters. The vertical balusters require drilling and either doweling or removing sections of existing concrete to install hook bars every 6"-8" into the existing concrete slab edge. The Top Handrail is then set on top of the Vertical balusters and is held in place using a pin and mortar method. This railing system does not have a Miami-Dade NOA (Notice of Acceptance) for use in HVHZ (High Velocity Hurricane Zones) and would require site specific engineered testing for wind load capabilities due to the long spans of the existing balconies and elevation height of the building. Under going such testing does not ensure a positive outcome and adds significantly to the cost of the work. Both the Top Handrail and Vertical Balusters come in color pigmented concrete or in a primed condition ready for a paint application after installation. Pigmented concrete or paint finishes will need regular maintenance to keep the original colors from fading due to UV exposure and to protect the concrete from coastal conditions.



3. **New Impact Glass Railing (Poma Infinity Railing System):** This railing system consists of 3 major components that comprise the overall railing assembly. Top Handrail, Impact Glass Panel, and Bottom rail which includes the slab attachment mechanism. This railing is a "Post less" system which means that there are no large vertical posts which require core drilling into the existing concrete slab. The manufacturer has a patented anchoring system specifically designed for this railing which meets Miami-Dade Approval and carries its own Miami Dade NOA (Notice of Acceptance). The patented anchoring system consists of Stainless Steel threaded rods which are imbedded into the slab at a spacing designated by engineering calculations based on wind load pressures at each elevation of the structure. The design of the bottom rail and anchoring system allows for a continuous spacing from the finished floor to the bottom rail which allows unobstructed water runoff from the balcony surfaces. The glass panels are comprised of High Strength, Impact Laminated Safety Glass and are designed, tested and approved for use in HVHZ (High Velocity Hurricane Zones). Both the Top Handrail and Bottom Rail are extruded aluminum and are finished using a powder coat finish system with a "Coastal Finish" application which further protects the finish when the product is utilized in areas subject to heavy levels of airborne corrosive salts and contaminants.

Based on our visual observations of the current condition of the existing concrete balusters, technical information regarding installation methods compiled for each of the 2 proposed new railing systems and future costs associated with maintenance programs for each, it is our professional engineering opinion that the Association implement the proposed glass railing system noted above for a number of reasons. This new proposed glass railing system is superior to the other option in several ways:

1. **Anchoring or Attachment to Existing Concrete Balcony Slab**

The installation methods for the proposed glass railing do not require extensive demolition and or modification to the existing concrete balcony slab edges. Due to significant code changes since the building was constructed in 1974, you are no longer allowed to "pin" concrete balusters into the slab through a simple extension of the internal rebar in the concrete baluster into a hole in the slab. The new code requires an elaborate tying in of the rebar in the slab to the rebar in the baluster. This would require major demolition and rebuilding of the existing slabs in order to meet code for a new concrete baluster system. However, the proposed glass railing system is a "Post



Unlike a concrete baluster system the glass railing system does not require any field applied painting or coating either at installation or in the future. The concrete balusters will need to be coated with either a paint or sealer product which will need to be applied after installation and periodically during the course of its lifespan. Additionally, the multiple concrete baluster assembly intersections will require periodic touch up and reapplication of joints lines between the top rail cap and vertical baluster along with the top rail cap to existing wall intersections. This periodic maintenance will require an additional scope of work and additional funds to be allocated to perform this procedure each time it is required. The proposed glass railing system does not require any type of field applied coating after installation or during the course of its lifespan or warranty period. Additional maintenance costs for the glass railing system would be limited to standard glass and handrail cleaning which could be performed during, and in the same fashion as the scheduled window cleaning currently being implemented.

5. Potential Weight Load Issues:

The existing structural concrete slab system was designed in the early 1970's based on weight load calculations including components such as the existing baluster assembly, taking into account the height and amount of balusters, and the spacing in between each. This calculated height and spacing no longer meets Building Code and if a new concrete baluster system is utilized it would require more, and taller, balusters spaced closer together which in turn would add considerable additional weight load to the existing concrete slabs which it was not originally designed for. We strongly advise against adding any additional weight load to the building's 44-year-old slabs without requiring additional reinforcement of the existing concrete structural slabs. In order to perform this reinforcement steel reinforcing bars would need to be installed to carry the additional load. This would require removal and replacement of additional concrete not projected in the repair quantities for the restoration project therefore increasing the overall cost substantially.

Conclusions:



Less" system which means that it does not require any large core drilling into the slab which could cause waterproofing failures, potential slab weakening, and corrosion issues in the future, and was designed to be compatible with old slabs that would benefit from the least undermining possible during a re-installation process. The anchoring system for this proposed railing assembly utilizes "Stainless Steel" threaded rods which are anchored to the existing slab based on engineered spacing requirements for wind load calculations for each elevation of the building. Utilizing this Stainless Steel anchoring system greatly reduces if not eliminates the potential for future corrosion from weather elements and the interactions between metal and concrete (Galvanic Corrosion) which is a major factor that causes concrete edge spalling and railing failure over an extended period of time.

2. Longevity of Product:

The proposed glass railing system comes with a 10-year warranty on all materials and finishes used during the fabrication process. Additionally this product comes with a Kynar "Coastal Finish" coating on the aluminum frames and hardware which further extends the product warranty period. This is the only product out of the proposed alternatives which has this warranty period.

3. Balcony Edge Finish and Water Drainage:

The proposed glass railing system has a continuous spacing underneath the bottom rail which allows rain water to pass unobstructed and run off the balcony edge. This system will prevent ponding water and future concrete edge spalling issues since the water and corrosive contaminants will not accumulate at the edge of the balcony slab as they would if a concrete baluster were blocking it and creating a limited space for these to run off. This condition is very evident in the existing concrete baluster conditions. Additionally this system creates a "Cleaner" more uniform finish on the outside edge of the balcony slab for waterproofing the edge of slab as part of the pending concrete and waterproofing renovation project. It also adds a more uniform finish with the balcony tile to railing intersection which would be located underneath the bottom rail instead of butted up against the back side of a concrete baluster leaving unfinished spaces in between.

4. Future Maintenance Costs:



Given your building's existing slab conditions and design criteria from 1974, as well as the complications involved in the installation of a new, code-compliant concrete railing system (including, but not limited to, the additional demolition and reconstruction of the slabs that would be required, the difficulties in attachment of the concrete railing system, and the serious concerns regarding the ability of the slabs to handle the additional weight load of a code-compliant concrete railing system), we would advise against the reinstallation of such a system, and our firm would be unwilling to sign off on the structural integrity and safety of such a system, if it were to be installed. Instead, it is our professional opinion that you should install a glass railing system, which system will provide important advantages in weight, structural stability of the concrete slab, longevity, maintenance and warranty. Other similarly situated buildings that we have advised have all chosen to install a glass railing system, which system we are confident that, if properly installed, would provide substantive advantages to the property.

Respectfully,



Andres Caicedo
President



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June 20, 2018

VIA EMAIL: towerhouse@atlanticbb.net

Association Board of Directors

C/o: TowerHouse Condominium Association, Inc.

5500 Collins Ave.

Miami Beach, FL 33140

Re: Balcony and Pool Deck Pre-Cast Railings

Dear Board Members,

We recently conducted a survey of all the pre-cast concrete railings on the building and identified a considerable number of damaged balusters, 2484 ea. (64%) and handrails, 578 LF (11%). These were in varying degree of deterioration from hairline cracks to fallen pieces of concrete because of corrosion to the steel reinforcement inside the concrete. Additionally, numerous cracked balusters and handrails were caulked and painted over, thereby hiding much of the damage. These repaired balusters and handrails will most likely continue to develop fractures and cracks in the future as exposure to the ocean environment continues to cause corrosion damage. The existing railing conditions can be considered dangerous and unsafe to the occupants of the units using the balconies under the applicable building codes and to people below exposed to possible falling pieces of concrete.

We also determined that the railings do not meet the minimum safety standards for spacing between vertical pickets within a single precast mold, or between individual precast balusters, which should be no larger than 4 inches. This can be dangerous and unsafe as has been evidenced by owners installing mesh, vinyl fencing, or metal pickets over their railings to protect small pets and visiting grandchildren from falling out the railings. In addition, the railings do not meet the maximum finished floor to bottom of vertical protection requirement of two inches due to the open and unobstructed nature of the design between individual precast balusters. Lastly, a substantial number of Owner's balcony railings no longer meet the minimum height from finished floor requirement of 42 inches due to the installation of new flooring surfaces without the demolition and removal of pre-existing flooring surfaces, resulting in a "built up" condition over existing tiles. We recommend that this practice be immediately prohibited at the TowerHouse as it not only violates code requirements relating to railing heights, but usually causes waterproofing issues and accelerates concrete deterioration due to the trapping of water between layers. Additionally, it adds unnecessary weight load to the balcony slab. We strongly suggest that this condition be alleviated where encountered in the building and the tile layers be removed back to the original balcony slab, any necessary concrete repairs be made, a new waterproofing membrane and a single finished surface be installed.

The Florida Building Code 2017 under the "Existing Buildings" section states that materials already in use in a building in compliance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the code official that the building or structure is unsafe or dangerous.



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The building code states that any structure or portion thereof (i.e. pre-cast railing baluster) shall be deemed unsafe if it poses a danger to human life or the public welfare. If the that structure has collapsed, or has partially collapsed, and/or there exists a significant risk of collapse, detachment or dislodgement of any portion, member under service loads it shall be deemed dangerous.

Based on our evaluation of the railings, their existing condition is unsafe and dangerous because of (1) falling pieces of concrete from cracked and spalling balusters and handrails, (2) diminished or weakened structural capacity because of the many cracks, (3) the spacing between pickets being larger than allowed, (4) the open to above nature of the design between precast balusters and, (5) in numerous cases, insufficient railing heights.

Furthermore, the TowerHouse is about to undergo a full concrete restoration program from top down under permits from the City of Miami Beach. The scope of work developed and bid out in November 2017 to multiple bidders included the repair/restoration of an estimated 1,000 linear feet of edge of balcony slabs to a depth of 12 inches. This work requires the full removal of all railings located in those to be repaired/restored areas. This equates to the required removal of approximately 20 percent of the buildings railings without taking into account the remaining balusters and rail caps identified for replacement in our prior report. The extent of this work will require the entire building's railing systems be brought up to code standards, whether by incorporating code compliant design changes to the replacement of the existing design (thereby rendering it a different design, still involving precast concrete components which will continue to require expensive maintenance and ultimately deteriorate over time), or by choosing a new design in weatherproof architectural metal or in weatherproof metal and glass.

Our recommendation is that the railing system be immediately repaired or replaced in accordance with code. Since so many balusters and handrails are damaged, easily over half the railings, and the building's restoration program requires the removal of at least 20 percent of the railings to facilitate the repairs, a complete replacement with a new system should be strongly considered as the more efficient option with the best long term advantages.

If you should have any questions or should need further information, please do not hesitate to contact our office.

Respectfully submitted,
Bunker Engineering and Construction Services, Inc.

Edgar V. Duenas

Edgar V. Duenas, PE
Principal Engineer

TOWER HOUSE CONDOMINIUM BUILDING CONDITION SURVEY SUMMARY

	Stack 01	Stack 02	Stack 03	Stack 04	PH Units	Pool Deck	Cabana Area	Vita Course	Total
BALUSTERS									
Number per unit	47	35	35	48		N/A	N/A	N/A	
Total Number	941	725	700	960	324	47	59	147	3903
Total Number to Replace	722	442	430	649	114	32	25	70	2484
Total % to Replace	77%	61%	61%	68%	35%	68%	42%	48%	64%
RAILING CAP									
Length per unit	64	46.5	46.5	69		N/A	N/A	N/A	
Total length	1306	965	930	1380	453	66	82	198	5380
Total length to repair	144	98	94	150	20	6	26	40	578
Total % to repair	11%	10%	10%	11%	4%	9%	32%	20%	11%

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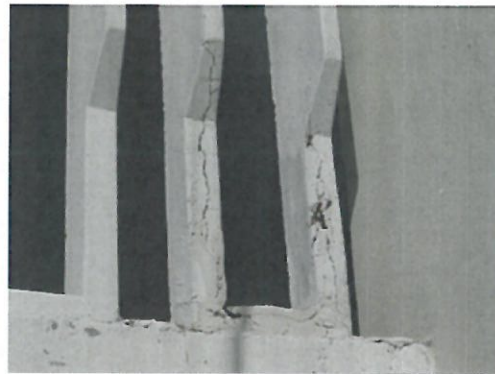
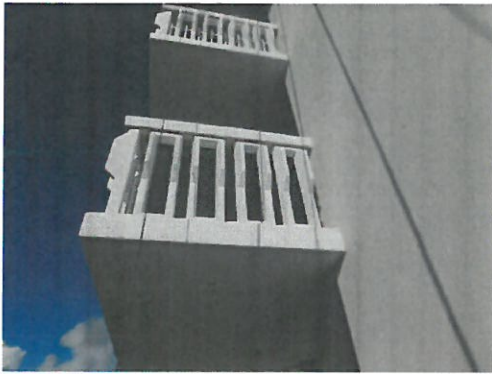


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Tower House Condominium

Damaged Baluster Photos



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May 4, 2018

VIA EMAIL: towerhouse@atlanticbb.net

Association Board of Directors

C/o: TowerHouse Condominium Association, Inc.

5500 Collins Ave.

Miami Beach, FL 33140

Re: Pre-Cast Railing Investigation

Dear Board Members;

We have conducted a survey of all the pre-cast railings on the building and we identified and counted all the damaged balusters and handrails. These included the pre-cast railings on the balconies, pool deck, and vita course. If a baluster was cracked or there was evidence of rust bleeding out, and/or exposed rebar, it was marked as damaged. Numerous cracked balusters and handrails had been caulked and painted and were difficult to identify as damaged. However, we believe we were able to identify most of the balusters with hidden damage.

The most common method of "repair" made by maintenance personnel and/or owners in condominiums is to apply caulking over the cracks and paint it. This only hides the crack and traps moisture inside. The trapped moisture accelerates the corrosion damage caused by the rebar and weakens the baluster. Balusters are pre-cast in a mold where four (4) pieces of #3 rebar are laid in place and the mortar mix poured into the mold.

Repair of balusters is typically difficult because of their unique shape, location on the edge of the balcony and the older low strength mortar composition. Chipping out the damaged concrete will actually cause the entire baluster to fracture. It is more efficient and economical to remove the baluster and replace it with a new one. The same applies to the handrail.

We have estimated 2484 (64%) balusters and 578 LF (11%) of handrail that are damaged and need to be replaced.

If you should have any questions or should need further information, please do not hesitate to contact our office.

Respectfully submitted,
Bunker Engineering and Construction Services, Inc.

Edgar V. Duenas

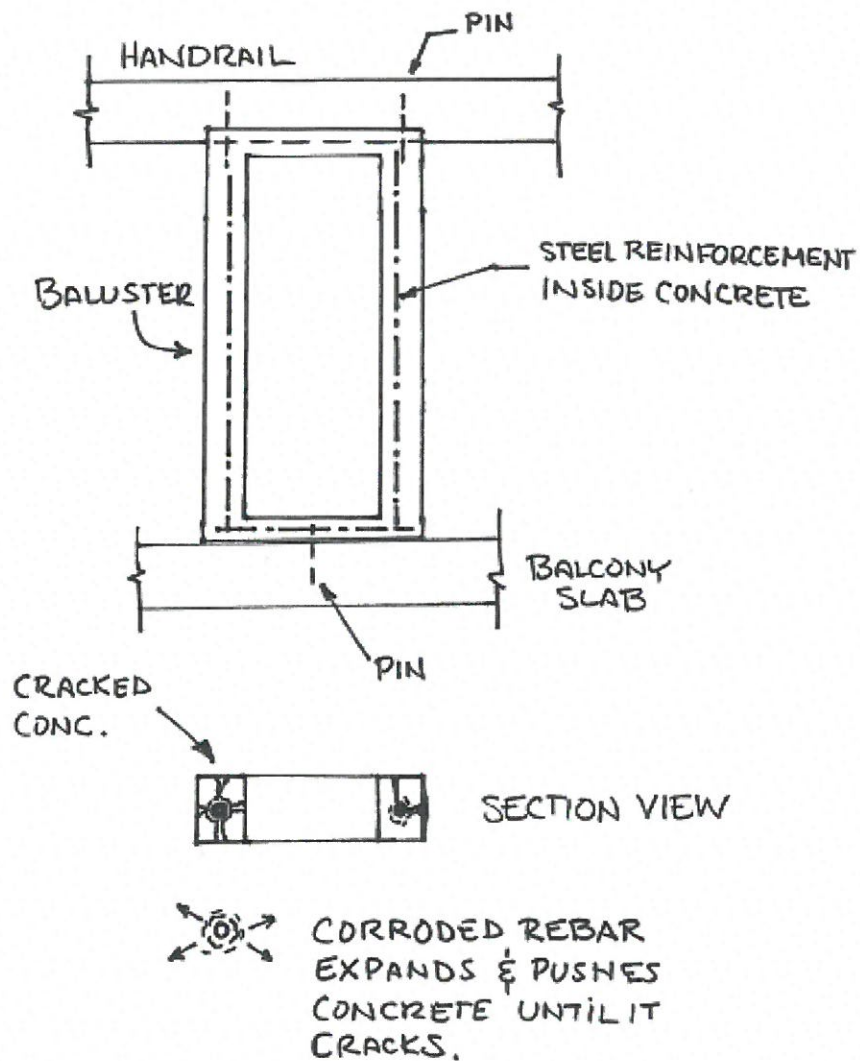
Edgar V. Duenas, PE
Principal Engineer

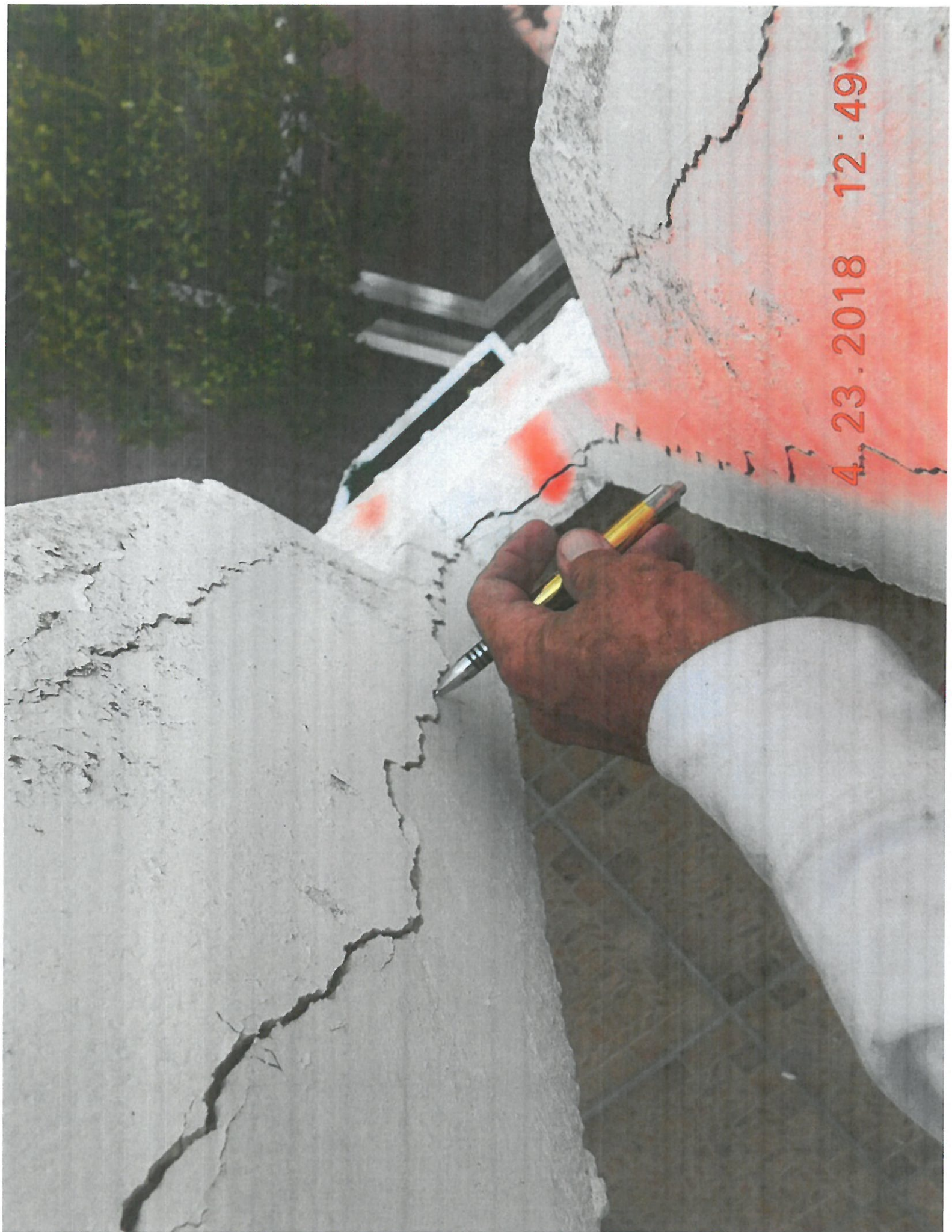
Enclosed (2)

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Tower House Condominium Baluster Diagram



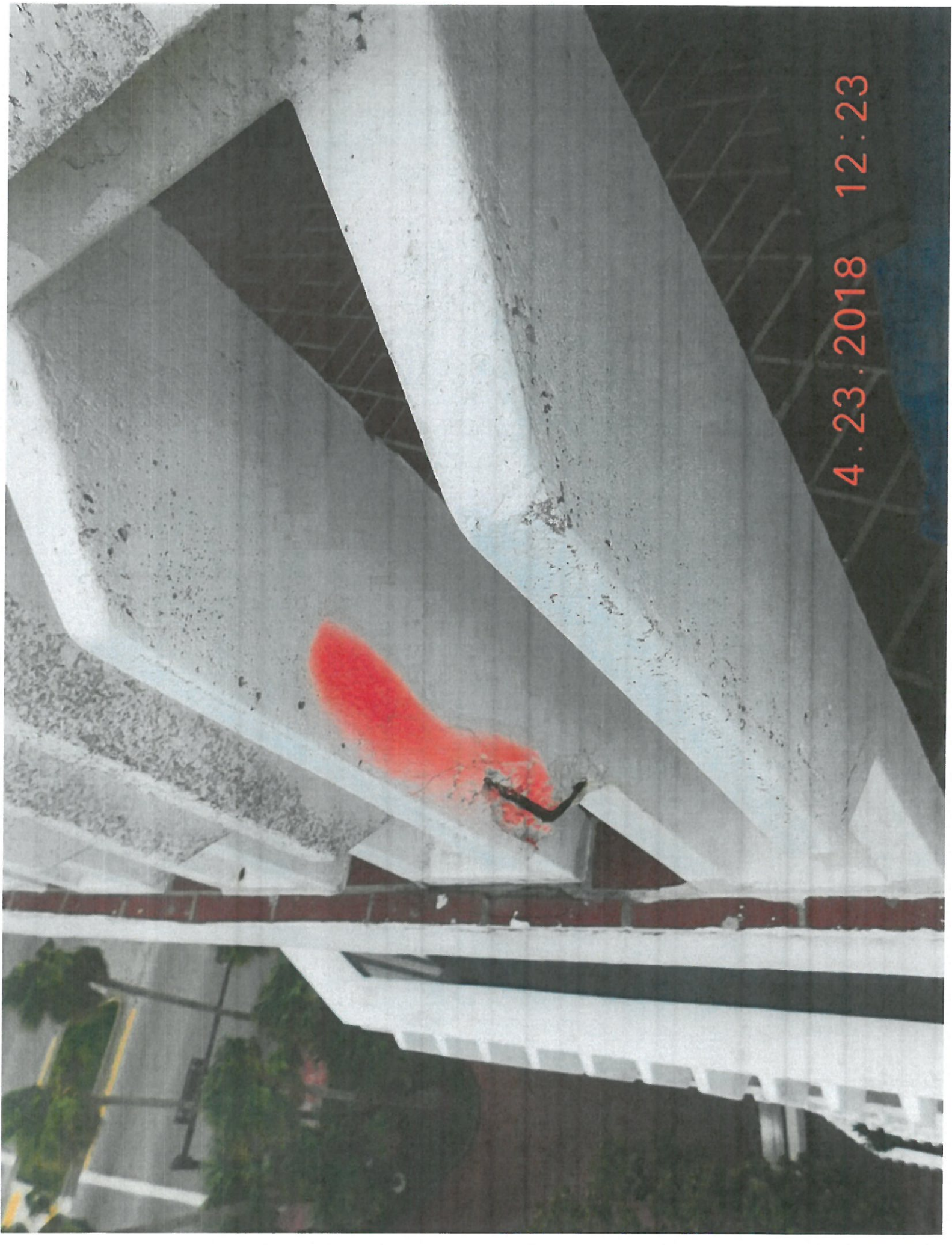


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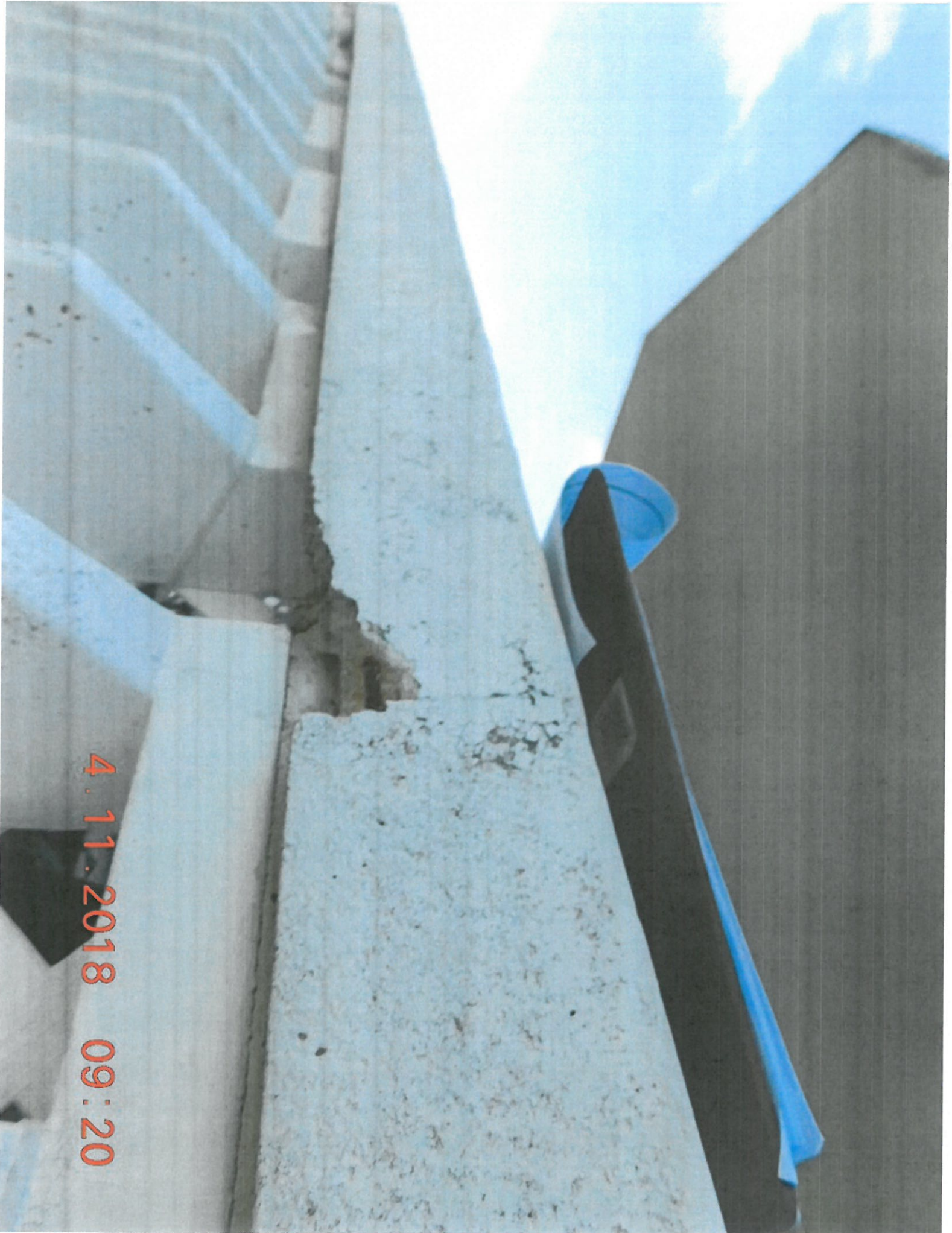


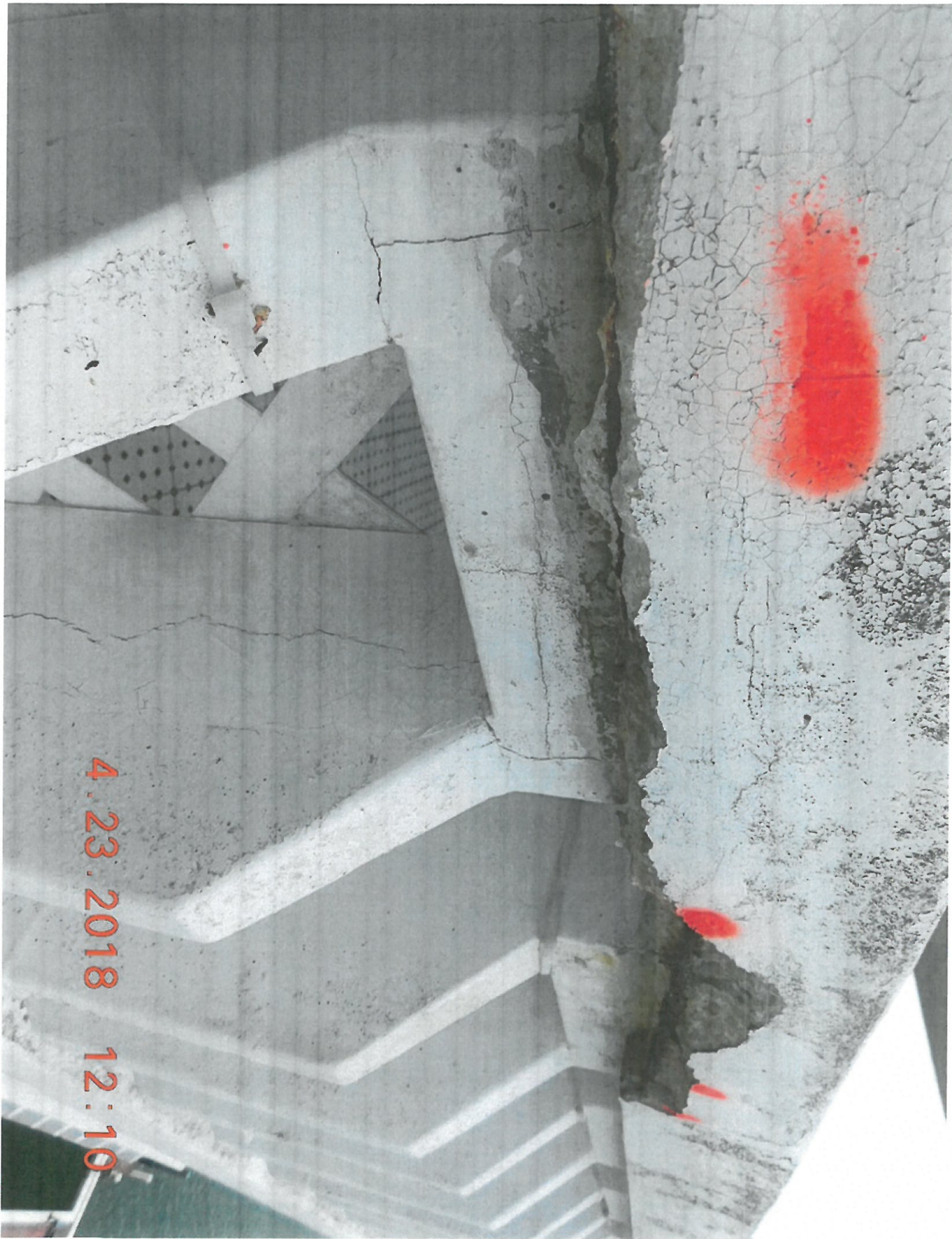


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