

October 16<sup>th</sup>, 2022

**From:** Kiro Engineering, L.L.C.  
P.O.Box 3281  
Mercerville, NJ 08619

**To:** Stacey Temple  
Devon Condominium  
2401 Pennsylvania Ave.  
Wilmington DE 19806

**Re: Structural Assessment at:**  
2401 Pennsylvania Ave.  
Wilmington DE 19806

Dear Stacey:

Based on your request, Kiro Engineering, LLC completed the structural assessment for 2401 Pennsylvania Ave, Wilmington DE, on October 15<sup>th</sup>, 2022. All our observations and comments are included in the attached report. Please let us know if we can assist you with further information.

Best Regards,



Mina A. Mikaeel, P.E.  
KIRO ENGINEERING, L.L.C.  
Phone: (609) 496 3718  
Fax: (646) 558 1338



# Structural Assessment Report

Prepared for:  
Stacey Temple  
Devon Condominium  
2401 Pennsylvania Ave.  
Wilmington DE 19806

Property Address:  
2401 Pennsylvania Ave.  
Wilmington DE 19806

Prepared by:  
Kiro Engineering, LLC



## **PURPOSE**

The purpose of the inspection was to review the structural stability of the foundation walls and structural framing of the Garage, Mechanical Room, Changing Rooms, and Pool, and provide a professional opinion on whether or not the structure was performing its intended function at the time of the inspection, or was in need of repair.

This report is provided for the use of the person to whom this report is addressed, and is in no way intended to be used by or copied by a third party, who may have different requirements. It is our purpose to provide information on the condition of the foundation on the day of the inspection

## **SCOPE**

The scope of the inspection included limited, visual observations at the interior and exterior of the structure. Only those items readily visible and accessible at the time of the inspection were viewed, and any items are causing visual obstruction, including, but not limited to, furniture, furnishings, floor or wall coverings, foliage, soil, appliances, insulation, etc., were not moved.

The basis of our opinions will be the apparent performance of that portion of the house readily visible at the time of the inspection. Disassembly or removal of any portion of the structure is beyond the scope of this inspection.

## **OBSERVATIONS**

### **1. Garage:**

- a. The overall structural condition of the exterior is accepted.
- b. The sprinkler system is in poor condition, with severe leakage points above the vehicles. We noticed some owners used hanging plastic to cover their vehicles. The way they cover the vehicles are considered a falling hazard that can cause severe damage to cars if the cover can't handle the weight of the accumulated water.
- c. The concrete ceilings and beam girders have moderate to severe concrete spalling and other spots with severe crumbling surfaces. Parts of the ceiling reinforcement are exposed and severely corroded after the concrete covering spalling away.
- d. We noticed limited leakage by the boilers room. We were unable to gain access to the boilers room to further investigate the condition.

### Recommendations:

- Change all the sprinkler pipes systems, including all the plumbing connections through the garage, and remove any hanging cover
- Clean the exposed reinforcement rebars, remove the rusted parts using a wire brush and high-pressure water, and use sandblasting if needed. Paint the exposed rebars with epoxy-supported sealants. Kiro Engineering, LLC will review the Contractor's means and methods at no additional cost.
- Add new reinforcement mesh (#4 rebars at 3-inches spacing) to connect the old concrete with the new concrete. Use epoxy-modified concrete overlay between the old concrete and the new concrete. Use shotcrete with a minimum strength of 3000 psi to install the new concrete cover to the exposed parts. Kiro Engineering, LLC will review the shotcrete and injection products at no additional cost.
- Further, investigate the leakage by the boilers room for any plumbing or connection repairs.
- It is recommended to seal all the wall and slab cracks using Epoxy-supported sealants (heavily-rubberized Heavy Duty Crack Filler / **QUIKRETE® Advanced Polymer Concrete Crack Sealant, Sikaflex® Concrete Fix, or similar**). The Contractor has to clean the cracks with high-pressure air or water before applying the sealant. It is required to **bevel the cracks** with a **minimum width of 0.2 inches and a minimum depth of 1 inches**. The cracks have to be dry before applying the sealant at a temperature at or above **50°F and dry condition for the next 48 hours**. Kiro Engineering, LLC will review the sealant and injection products at no additional cost.

**Cost Estimate for the above-mentioned repairs: \$45,000 +/-.**

## 2. Mechanical Room:

- a. The overall structural condition of the exterior is poor.
- b. The plumbing system is in very poor condition, with severe leakage. The plumbing connections through the walls are beyond repair and must be replaced. We noticed severe leakage through and around the mechanical system and pipes, with other signs of old leakage through the mechanical room walls.
- c. The severe leakage and moisture caused the wall paint to peel.



- d. The moisture and leakage caused mold and air quality.
- e. The moisture and leakage caused minor to moderate damage to the wall and slab. We noticed soft and wet spots and other spots with easily punched concrete.
- a. The concrete ceilings have moderate to severe concrete spalling and other spots with severe crumbling surfaces. Parts of the ceiling reinforcement are exposed and severely corroded after the concrete covering spalling away.
- f. Efflorescence (white powdery deposits) visible on the surface of the foundation walls is an indication of moisture intrusion all over the perimeter of the rooms. Efflorescence can also damage materials and encourage the growth of microbes such as mold.
- g. The moisture and leakage caused moderate to severe wood decay and rot to the interior roof cover and rotted roof joists.

**Recommendations:**

- Remove the efflorescence deposits, wall tiles, and peeled paints, and wash the walls with bleach before starting any repairs.
- Change all the plumbing systems, including all the plumbing connections through the walls.
- Clean the exposed reinforcement rebars, remove the rusted parts using a wire brush and high-pressure water, and use sandblasting if needed. Paint the exposed rebars with epoxy-supported sealants. Kiro Engineering, LLC will review the Contractor's means and methods at no additional cost.
- Add new reinforcement mesh (#4 rebars at 3-inches spacing) to connect the old concrete with the new concrete. Use epoxy-modified concrete overlay between the old concrete and the new concrete. Use shotcrete with a minimum strength of 3000 psi to install the new concrete cover to the exposed parts. Kiro Engineering, LLC will review the shotcrete and injection products at no additional cost.
- Remove any soft spots or easy-punched concrete from the slab. Pour a concrete pad overlay over the existing slab. Pour a minimum of a 1.5-inches thick concrete with a welded wire mesh (WWM) 3x3 to level the slab. Use epoxy-modified concrete overlay between the old concrete and the new concrete. Kiro Engineering, LLC will review the overlay products at no additional cost.
- Install new roof with new drainage system with gutters and downspouts. Use sloped flashing at to drain the water away and prevent water puddling.

- Remove any rotted wood covering, and use epoxy wood filler as needed.
- Sister the roof joists as needed.

**Cost Estimate for the above-mentioned repairs: \$110,000 +/-.**

### **3. Changing Rooms:**

- a. The overall structural condition of the exterior is poor.
- b. The plumbing system is in very poor condition, with severe leakage points and loose plumbing connections all over the rooms. The plumbing system is beyond repair and must be replaced.
- c. The severe leakage and moisture caused the wall paint to peel all over the rooms.
- d. The moisture and leakage caused mold and air quality issues all over the rooms.
- e. The moisture and leakage caused severe damage to the wall tiles and slab. We noticed many soft and wet spots and other spots with easily punched concrete.
- f. The concrete ceilings have moderate to severe concrete spalling and other spots with severe crumbling surfaces. Parts of the ceiling reinforcement are exposed and severely corroded after the concrete covering spalling away.
- g. Efflorescence (white powdery deposits) visible on the surface of the foundation walls is an indication of moisture intrusion all over the perimeter of the rooms. Efflorescence can also damage materials and encourage the growth of microbes such as mold.
- h. The moisture and leakage caused moderate to severe wood decay and rot to the interior and exterior wooden members, including partitions and structural posts.
- i. The roof is a poor condition, including a poor drainage system that collects the water in the roof valley, leading to leakage problems (Figures 3.40 and 3.41).

### **Recommendations:**

- Remove the efflorescence deposits, wall tiles, and peeled paints, and wash the walls with bleach before starting any repairs.
- Change all the plumbing systems, including all the plumbing connections through the walls.
- Clean the exposed reinforcement rebars, remove the rusted parts using a wire brush and high-pressure water, and use sandblasting if needed. Paint the exposed rebars with epoxy-supported sealants. Kiro Engineering, LLC will review the Contractor's means and methods at no additional cost.
- Add new reinforcement mesh (#4 rebars at 3-inches spacing) to connect the old concrete with the new concrete. Use epoxy-modified concrete overlay between the old concrete and the new concrete. Use shotcrete with a minimum strength of 3000 psi to install the new concrete cover to the exposed parts. Kiro Engineering, LLC will review the shotcrete and injection products at no additional cost.
- Remove any soft spots or easy-punched concrete from the slab. Pour a concrete pad overlay over the existing slab. Pour a minimum of a 1.5-inches thick concrete with a welded wire mesh (WWM) 3x3 to level the slab. Use epoxy-modified concrete overlay between the old concrete and the new concrete. Kiro Engineering, LLC will review the overlay products at no additional cost.
- Install new roof with new drainage system with gutters and downspouts. Use sloped flashing at the valley of the roof to drain the water away and prevent water puddling.
- Remove any rotted wood, and use epoxy wood filler as needed.
- Paint the exterior and interior of the building. Use dry-lock for the interior as needed before installing any new tiles or finishing.

**Cost Estimate for the above-mentioned repairs: \$65,000 +/-.**

### **4. Swimming Pool:**

- a. The overall structural condition of the exterior is accepted.
- b. Poor waterline tiles and peeled pool walls. The condition can lead to water penetration behind the walls.



- c. We observed a few cracks in the pool flooring. The condition can lead to water penetration underneath the slab, causing structural instability pool.
- d. We observed poor sealant around the coping. The condition can lead to water penetration underneath the deck slab, causing local settlement cracks around the deck slab.

**Recommendations:**

- It is highly recommended to further investigate the bottom of the pool via a pool inspector.
- It is required to reduce the water elevation in the pool to complete the repairs. It is highly recommended to remove the peeled parts of the walls and re-paint/re-seal them.
- Complete resealing of the coping with high elasticity modulus Polyurethane-Epoxy material. Kiro Engineering, LLC will review the sealing products at no additional costs.

**Cost Estimate for the above-mentioned repairs: \$12,000 +/-.**



Figure 1.1 - Overhanging cover.



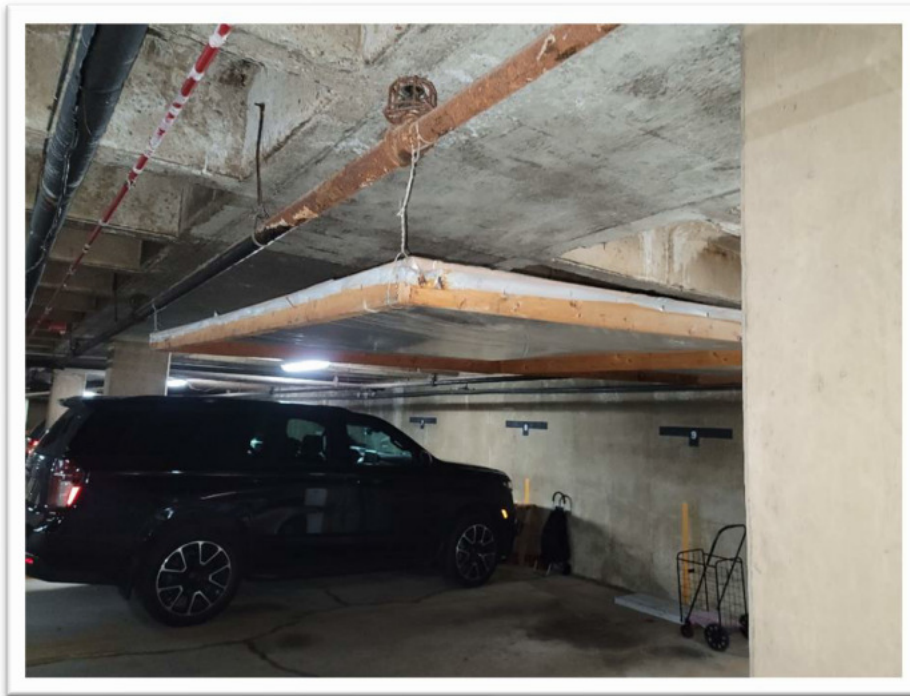


Figure 1.2 - Overhanging cover.



Figure 1.3 - Rusted fire sprinkler pipes.



Figure 1.4 - Signs of an old water leakage.



Figure 1.5 - Concrete Beam Girders.





Figure 1.6 - Concrete Beam Girders.



Figure 1.7 - Concrete Beam Girders.



Figure 1.8 - Concrete Beam Girders over the plastic cover.



Figure 1.9 - Rusted fire sprinkler pipe.





Figure 1.10 - Limited spalling surface that can lead to reinforcement corrosion.



Figure 1.11 - Crumbling and spalling concrete surface with efflorescence deposits.



Figure 1.12 - Signs of old leakage with efflorescence deposits.



Figure 1.13 - Signs of old leakage with efflorescence deposits.





Figure 1.14 - Crumbling and spalling concrete surface.



Figure 1.15 - Crumbling and spalling concrete surface.



Figure 1.16 - Crumbling and spalling concrete surface.



Figure 1.17 - Exposed corroded reinforcement of the beam girder and crumbling surface.





Figure 1.18 - Exposed corroded reinforcement of the beam girder and crumbling surface.



Figure 1.19 - Exposed corroded reinforcement of the beam girder and crumbling surface.



Figure 1.20 - Exposed corroded reinforcement of the beam girder.



Figure 1.21 - Exposed corroded reinforcement of the beam girder.



Figure 1.22 - Exposed corroded reinforcement of the ceiling slab.



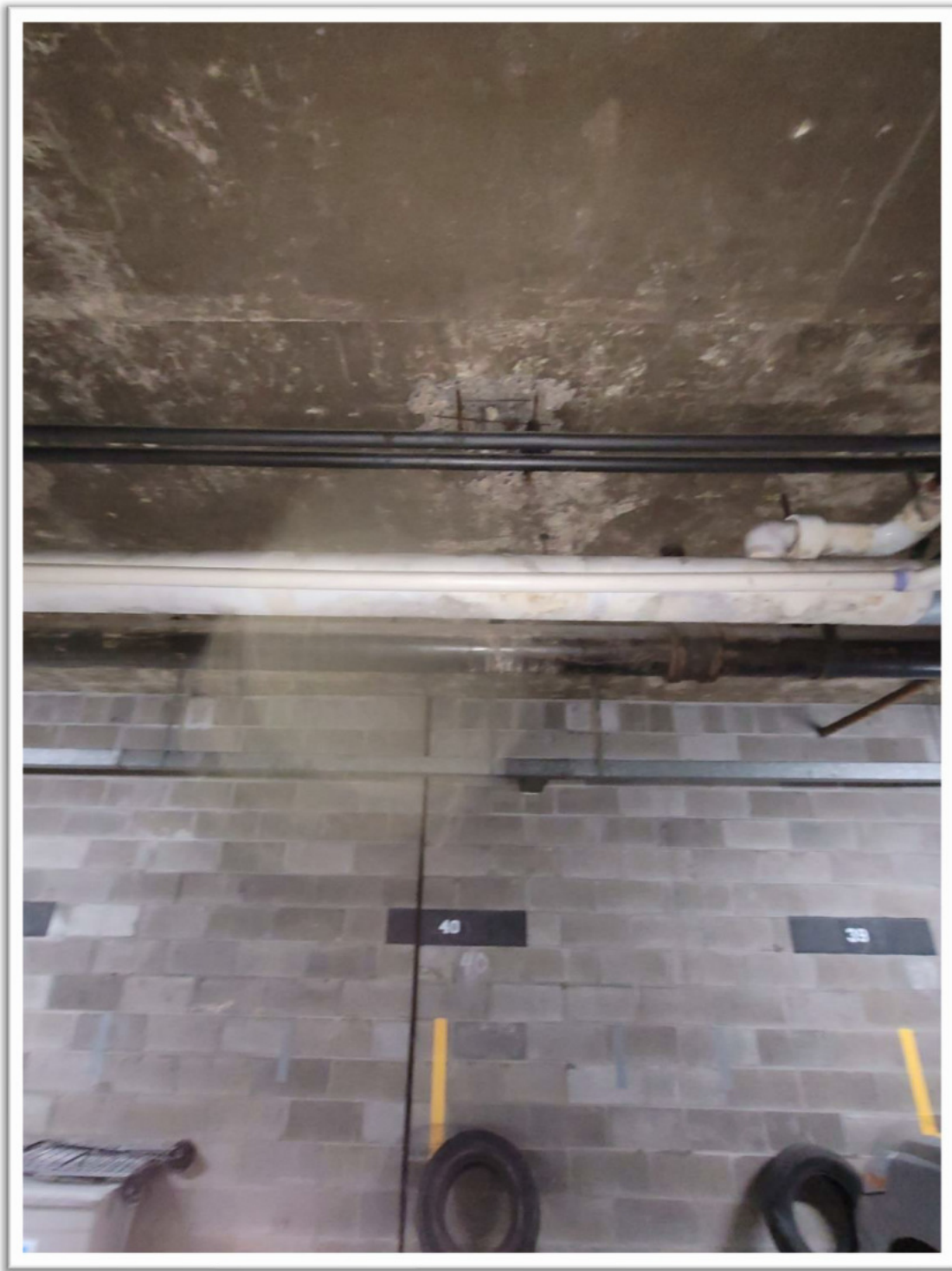


Figure 1.23 - Exposed corroded reinforcement of the ceiling slab.





Figure 1.24 - Exposed corroded reinforcement of the ceiling slab.



Figure 1.25 - Concrete beams and beam girders.

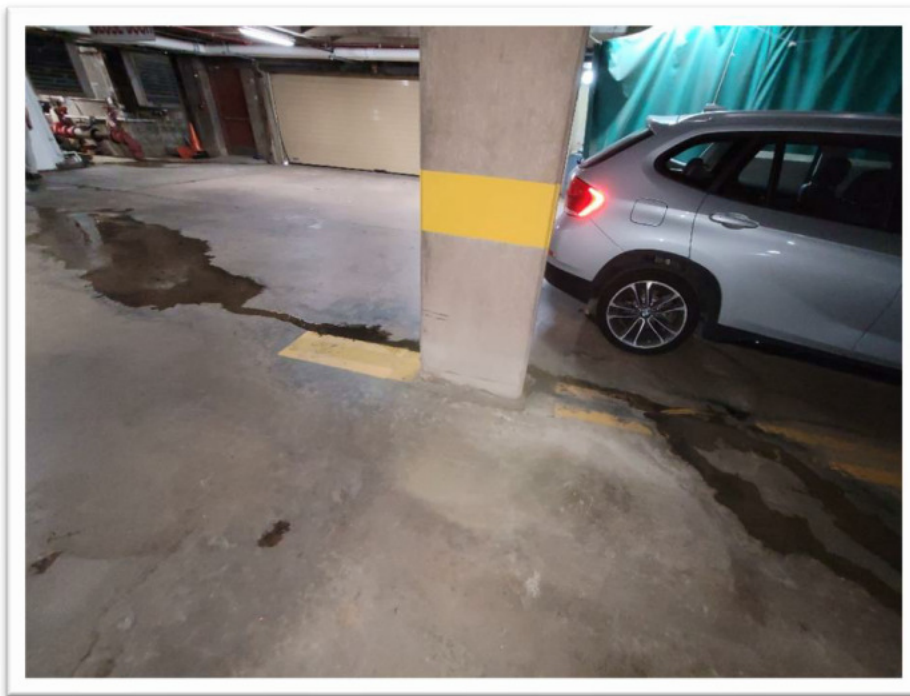


Figure 1.26 - Leakage from the boiler room.



Figure 1.27 - Exposed corroded reinforcement of the ceiling slab with signs of old leakage.



Figure 1.28 - Exposed corroded reinforcement of the ceiling slab.





Figure 1.29 - Leakage from the boiler room.

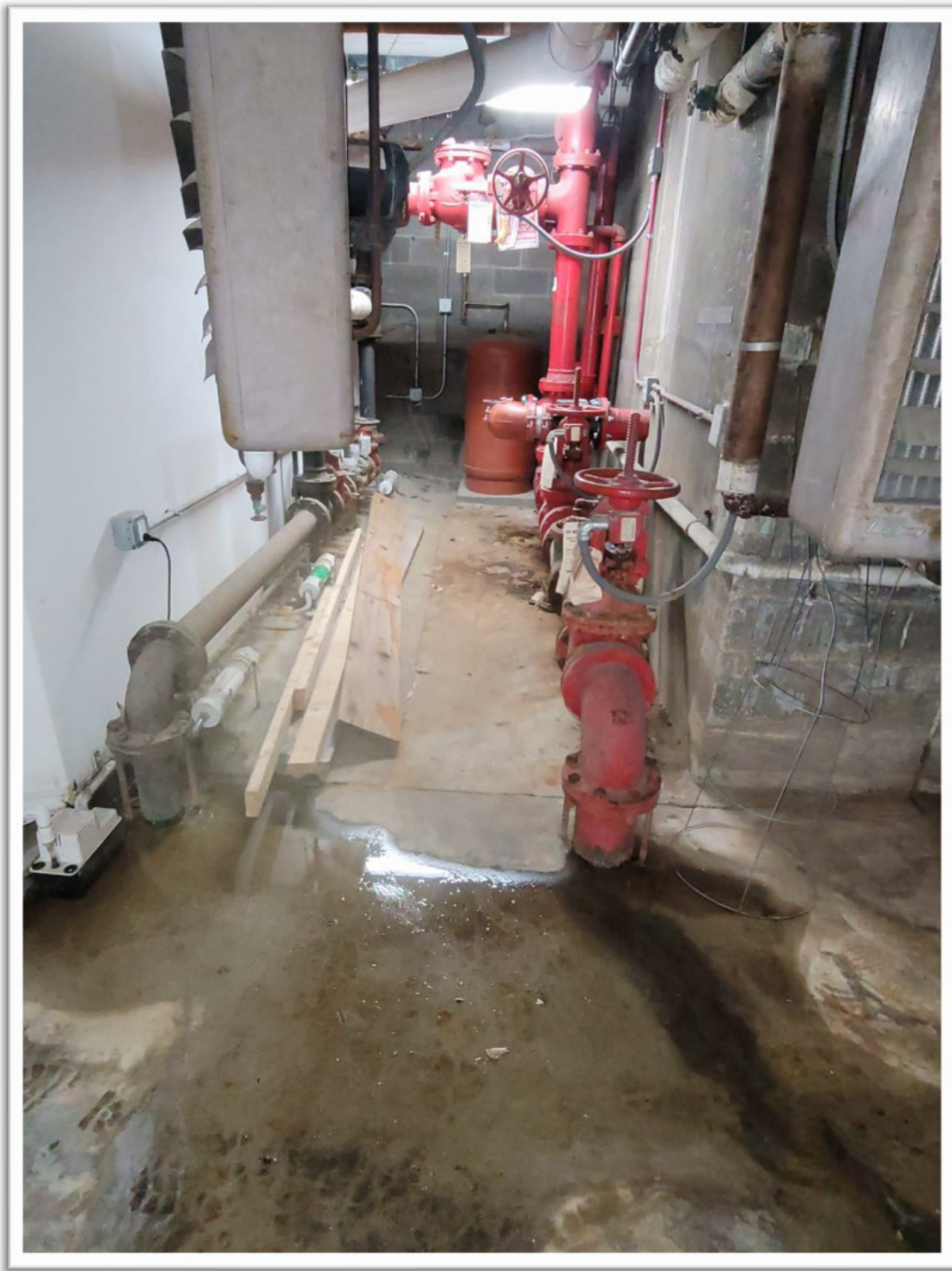


Figure 1.30 - Leakage from the boiler room.

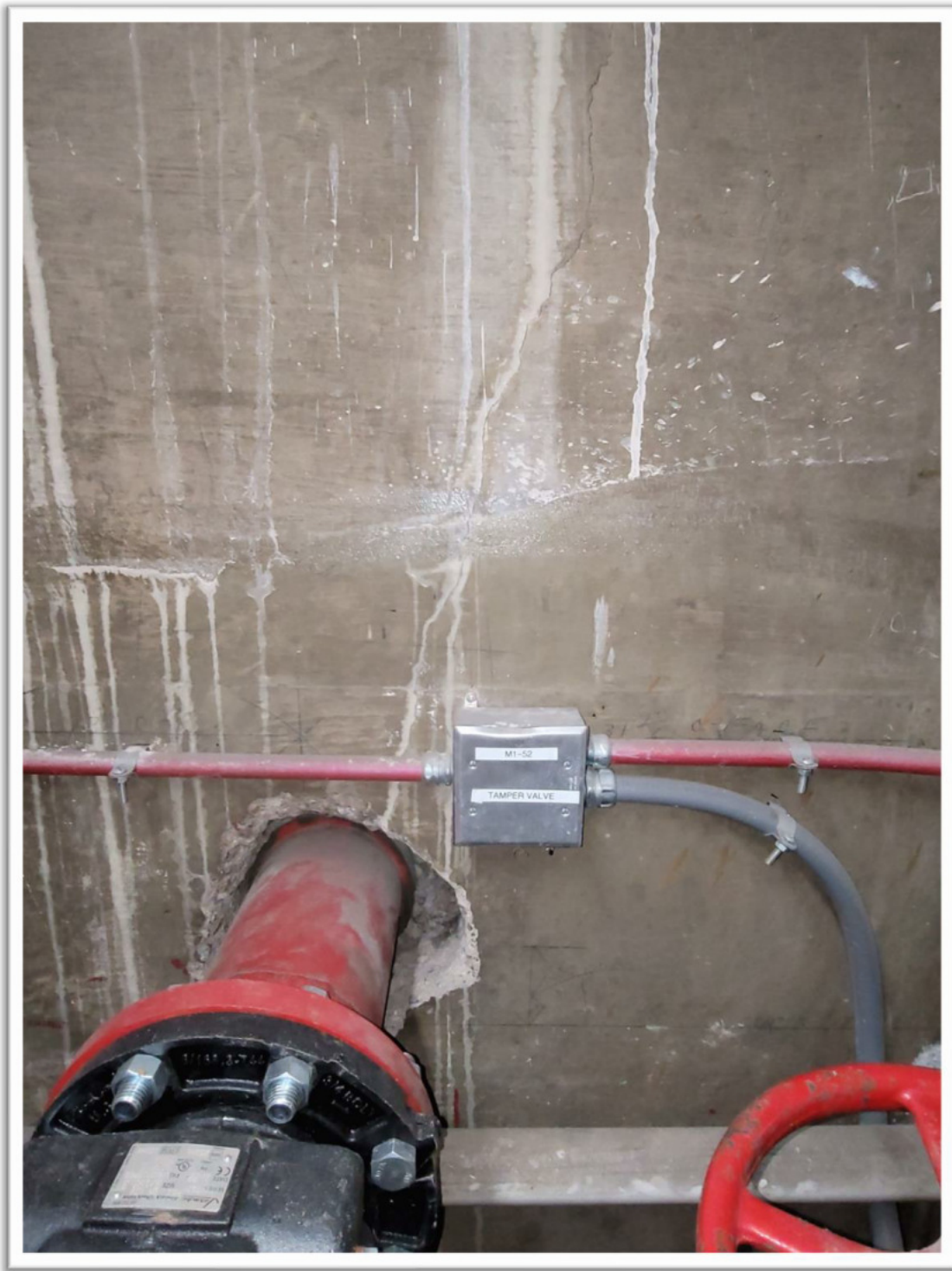


Figure 1.31 - Concrete wall mechanical cracks due to the pipe installation.





Figure 1.32 - Concrete wall mechanical cracks.



Figure 1.33 - Garage slab settlement cracks.



Figure 1.34 - Garage slab settlement cracks.



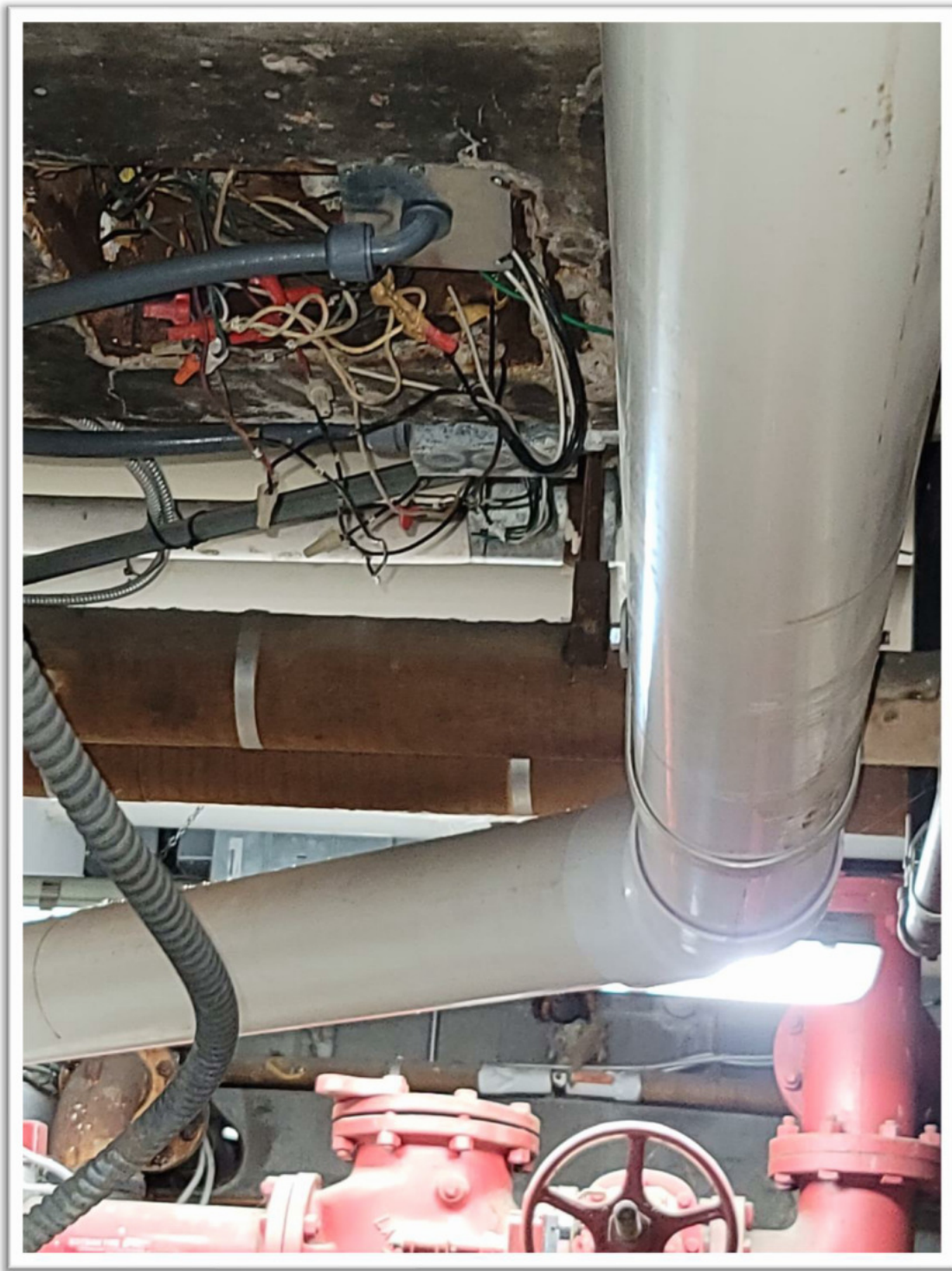


Figure 1.35 - Signs of old leakage around the wires.



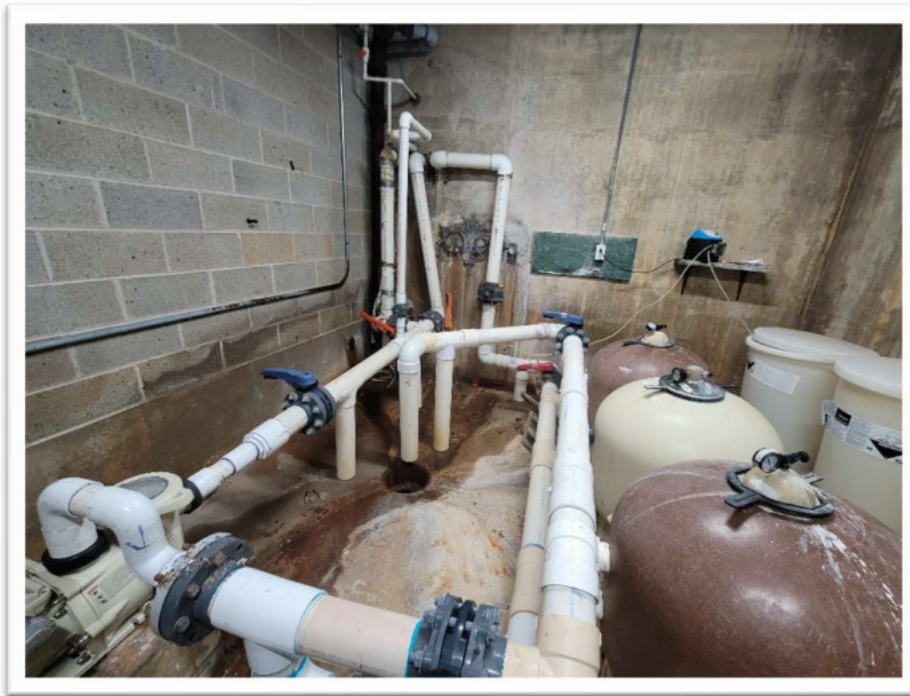


Figure 2.1 - Mechanical Room.

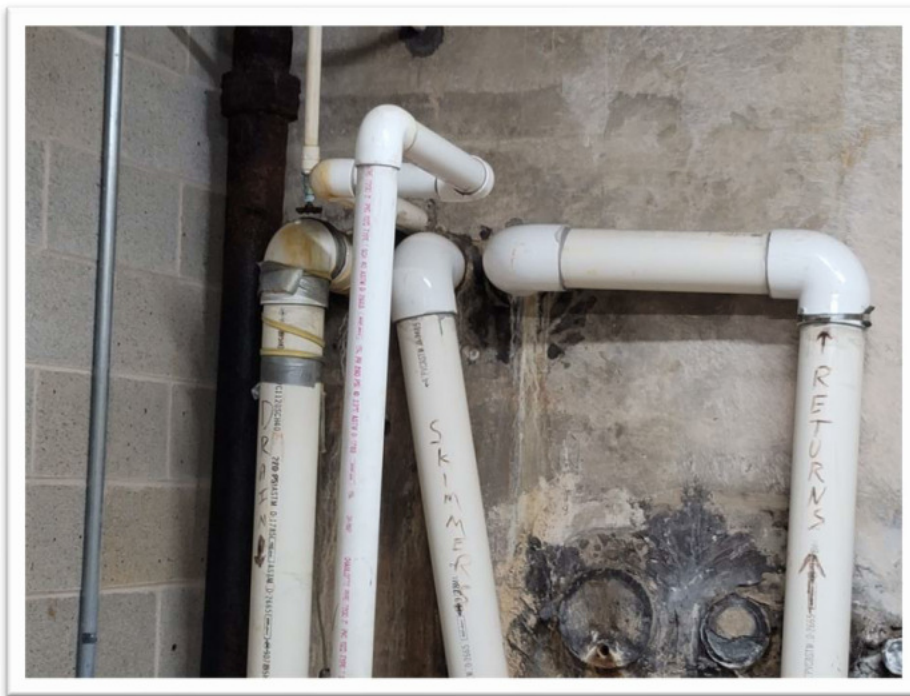


Figure 2.2 - Signs of old leakage through the mechanical room walls.



Figure 2.3 - Spalling and crumbling concrete surface through the ceiling slab and severely corroded reinforcement.



Figure 2.4 - Spalling and crumbling concrete surface through the ceiling slab and severely corroded reinforcement.





Figure 2.5 - Spalling and crumbling concrete surface through the ceiling slab and severely corroded reinforcement.



Figure 2.6 - Spalling and crumbling concrete surface through the ceiling slab and severely corroded reinforcement.





Figure 2.7 - Spalling and crumbling concrete surface through the ceiling slab and corroded reinforcement.

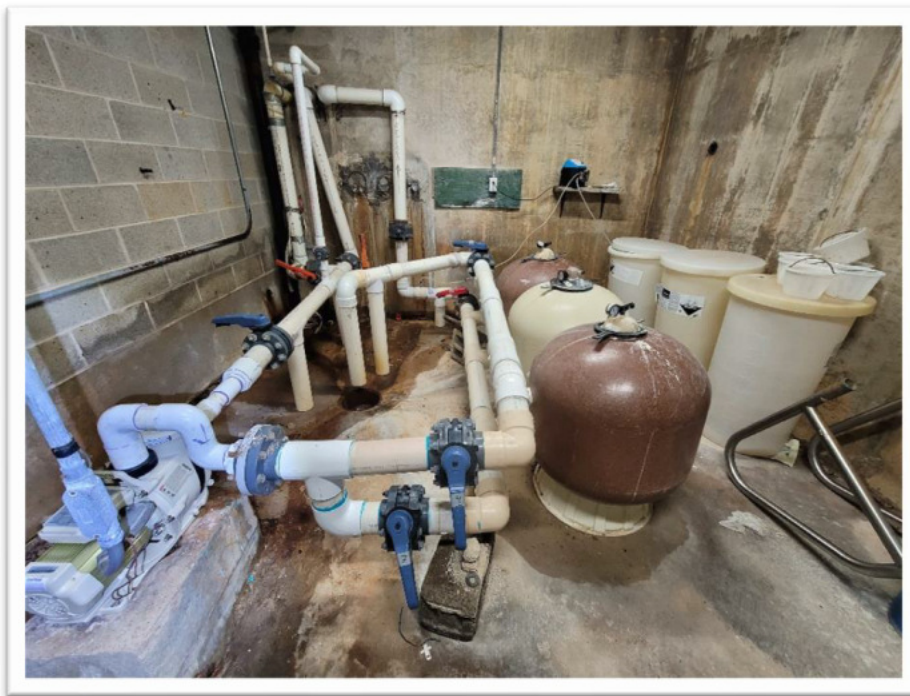


Figure 2.8 - Severe leakage through and around the mechanical system and pipes.

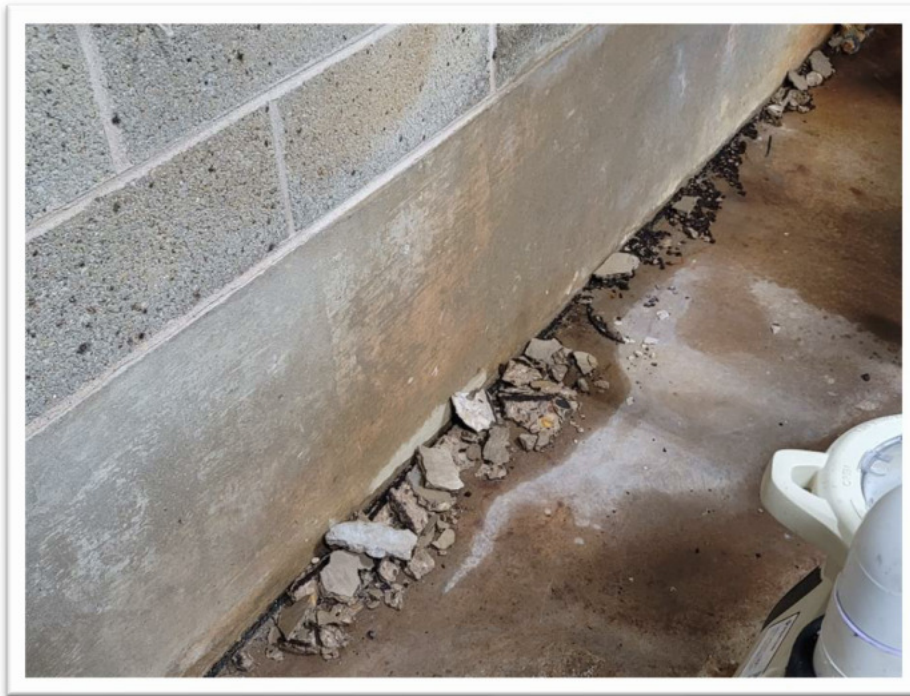


Figure 2.9 - Crumbling concrete pieces from the ceilings.



Figure 2.10 - Severe leakage through and around the mechanical system and pipes.



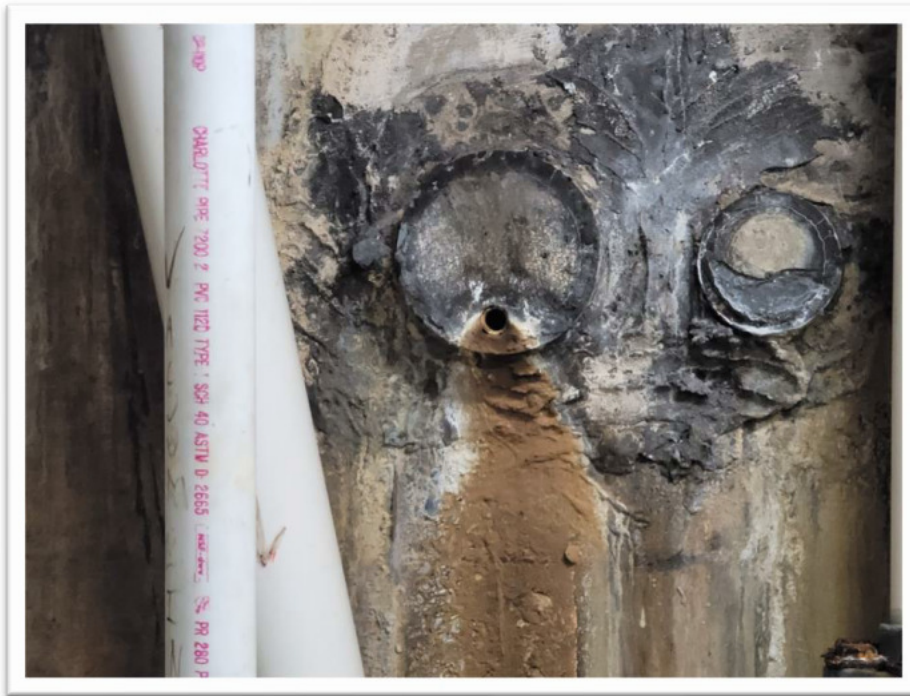


Figure 2.11 - Severe leakage through and around the mechanical system and pipes.



Figure 2.12 - Severe leakage through and around the mechanical system and pipes.





Figure 2.13 - Signs of old leakage through the mechanical room walls.



Figure 2.14 - Exposed corroded slab reinforcement.

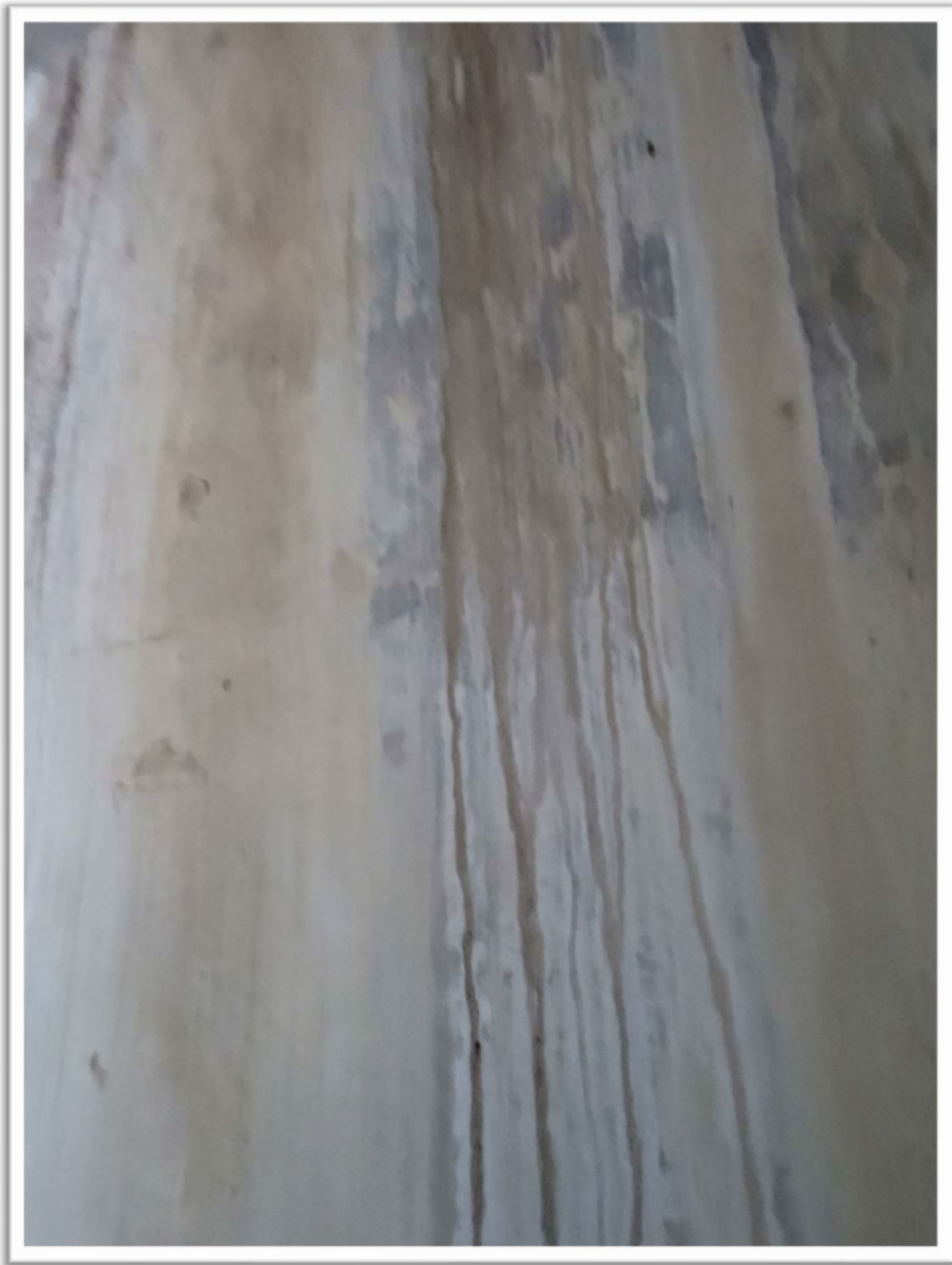


Figure 2.15 - Signs of old leakage through the mechanical room walls.



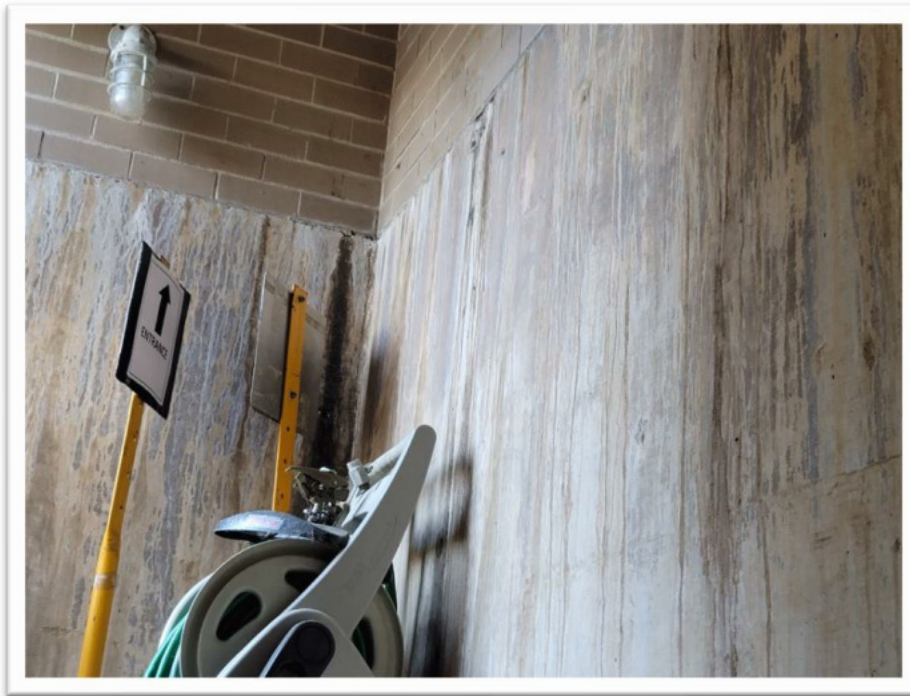


Figure 2.16 - Signs of old leakage through the mechanical room walls.



Figure 2.17 - Rotted roof joist.



Figure 2.18 - Rotted roof joist.

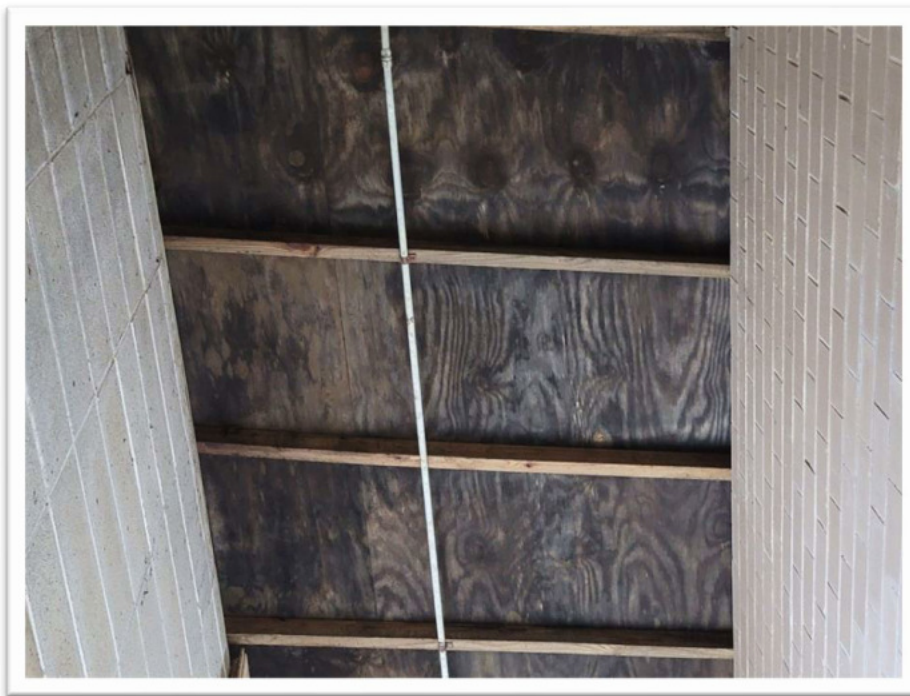


Figure 2.19 - Signs of severe leakage and rot to the roof plywood cover.



Figure 2.20 - Signs of severe leakage and rot to the roof plywood cover.



Figure 2.21 - Signs of severe leakage and rot to the roof plywood cover.





Figure 2.22 - Signs of severe leakage and rot to the roof plywood cover.

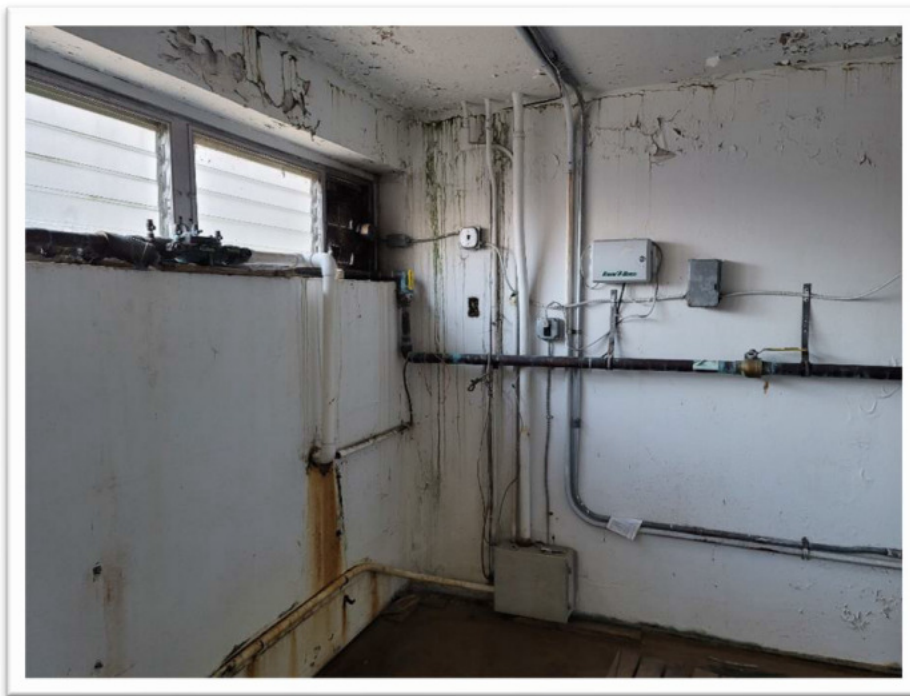


Figure 3.1 - Changing Rooms - Peeled painting due to severe leakage.



Figure 3.2 - Changing Rooms - Water stains due to severe leakage.



Figure 3.3 - Severe leakage damage.



Figure 3.4 - Peeled painting due to severe moisture damage from leakage.



Figure 3.5 - Peeled painting due to severe moisture damage from leakage.





Figure 3.6 - Peeled painting due to severe moisture damage from leakage.



Figure 3.7 - Poor plumbing connections causing water damage to the slab.



Figure 3.8 - Peeled painting due to severe moisture damage from leakage.



Figure 3.9 - Peeled painting due to severe moisture damage from leakage.



Figure 3.10 - Shower rooms.





Figure 3.11 - Moisture damage and mold.



Figure 3.12 - Moisture damage and mold.



Figure 3.13 - Water damage to the floors.



Figure 3.14 - Moisture damage, peeled painting and mold.



Figure 3.15 - Peeled painting and exposed concrete surface.



Figure 3.16 - Peeled painting and exposed concrete surface.





Figure 3.17 - Moisture and Rot Damage.



Figure 3.18 - Soft concrete and easily punched slab.



Figure 3.19 - Peeled painting and exposed concrete surface.



Figure 3.20 - Damage to the floor slab.

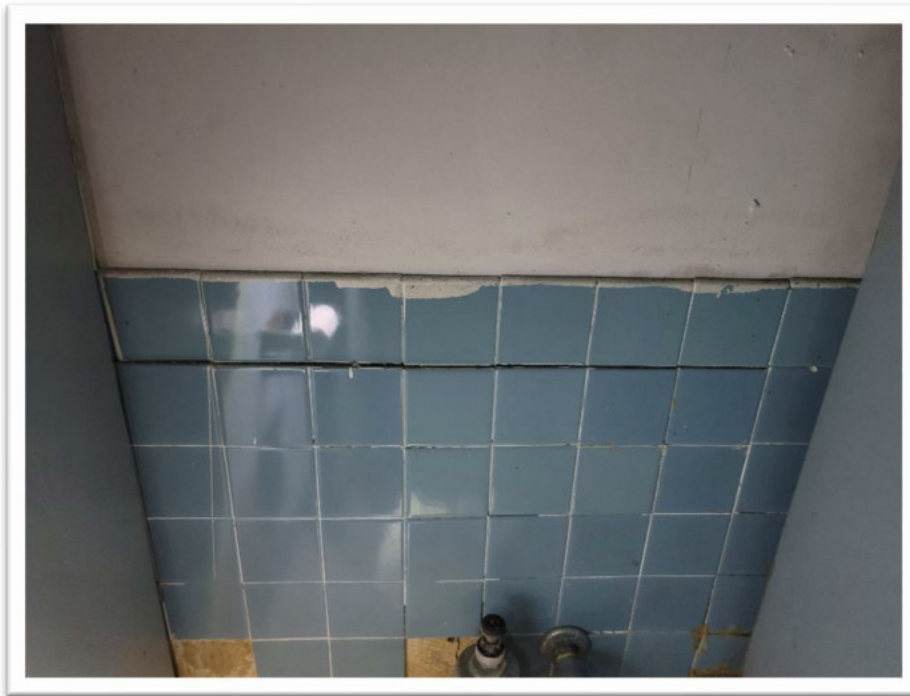


Figure 3.21 - Damage to the tile from the moisture.



Figure 3.22 - Damage to the tile from the moisture.





Figure 3.23 - Mold through the ceiling.



Figure 3.24 - Exposed concrete surface due to moisture damage.

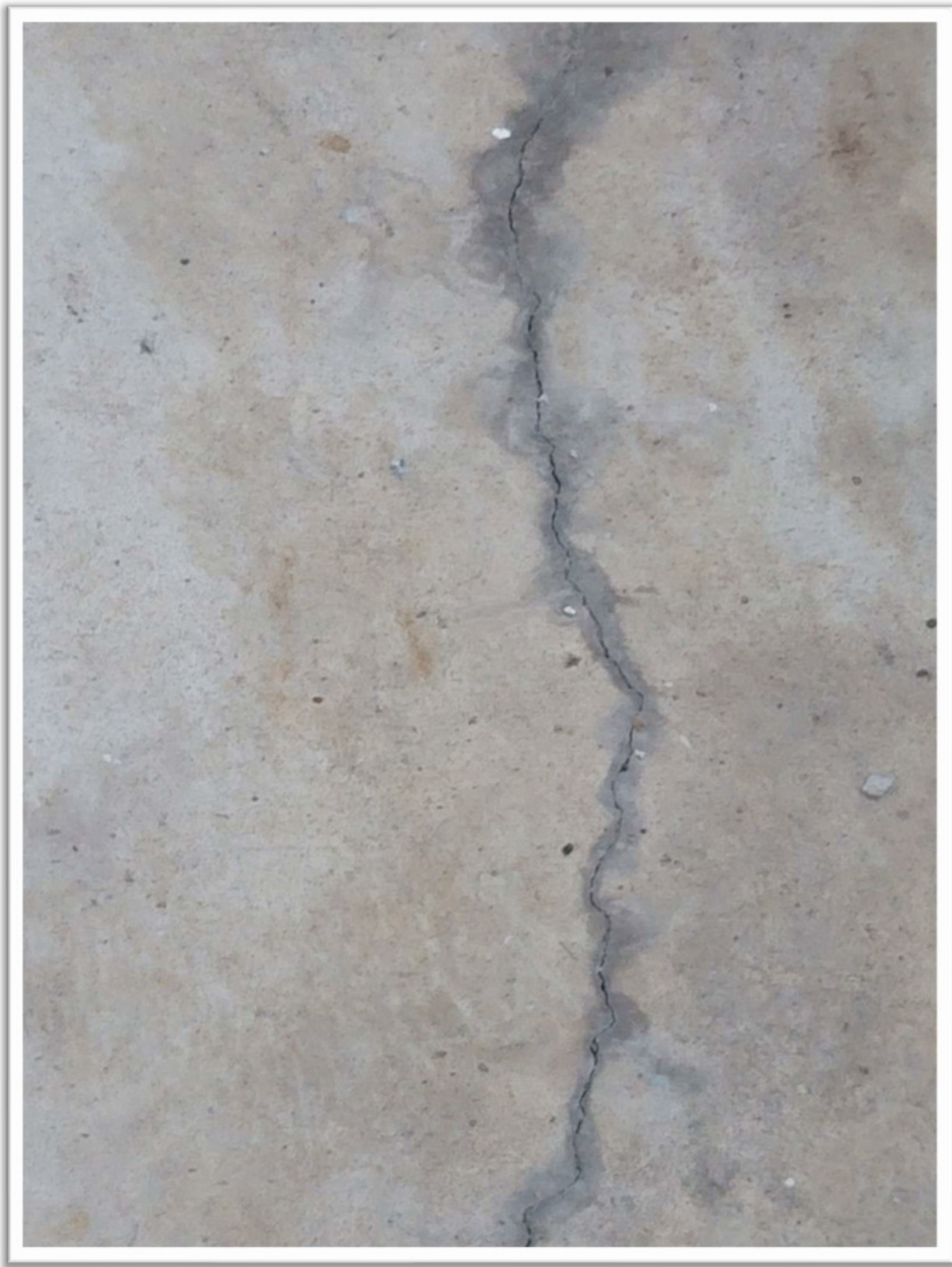


Figure 3.25 - Cracks through the Slab.



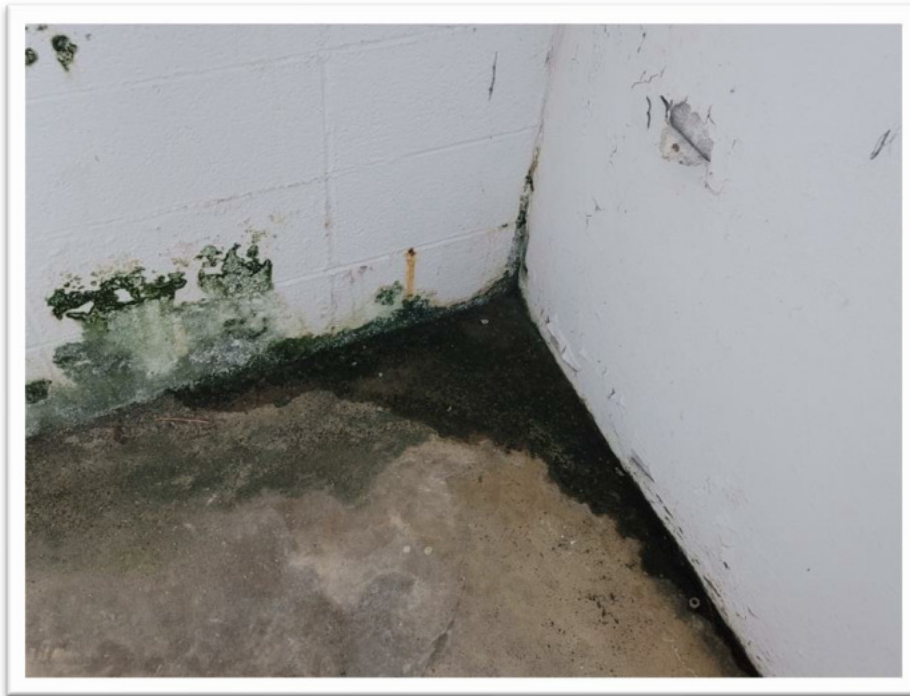


Figure 3.26 - Severe leakage through the walls.

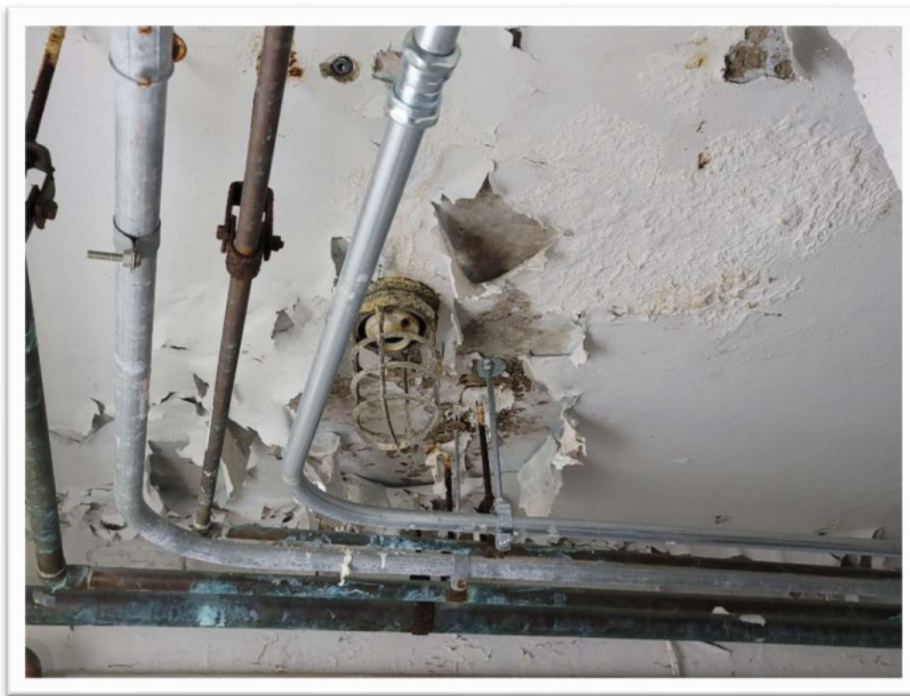


Figure 3.27 - Severe peeled painting through the ceiling from moisture damage.



Figure 3.28 - Mold and Severe peeled painting through the ceiling from moisture damage.



Figure 3.29 - Peeled painting through the ceiling from moisture damage.



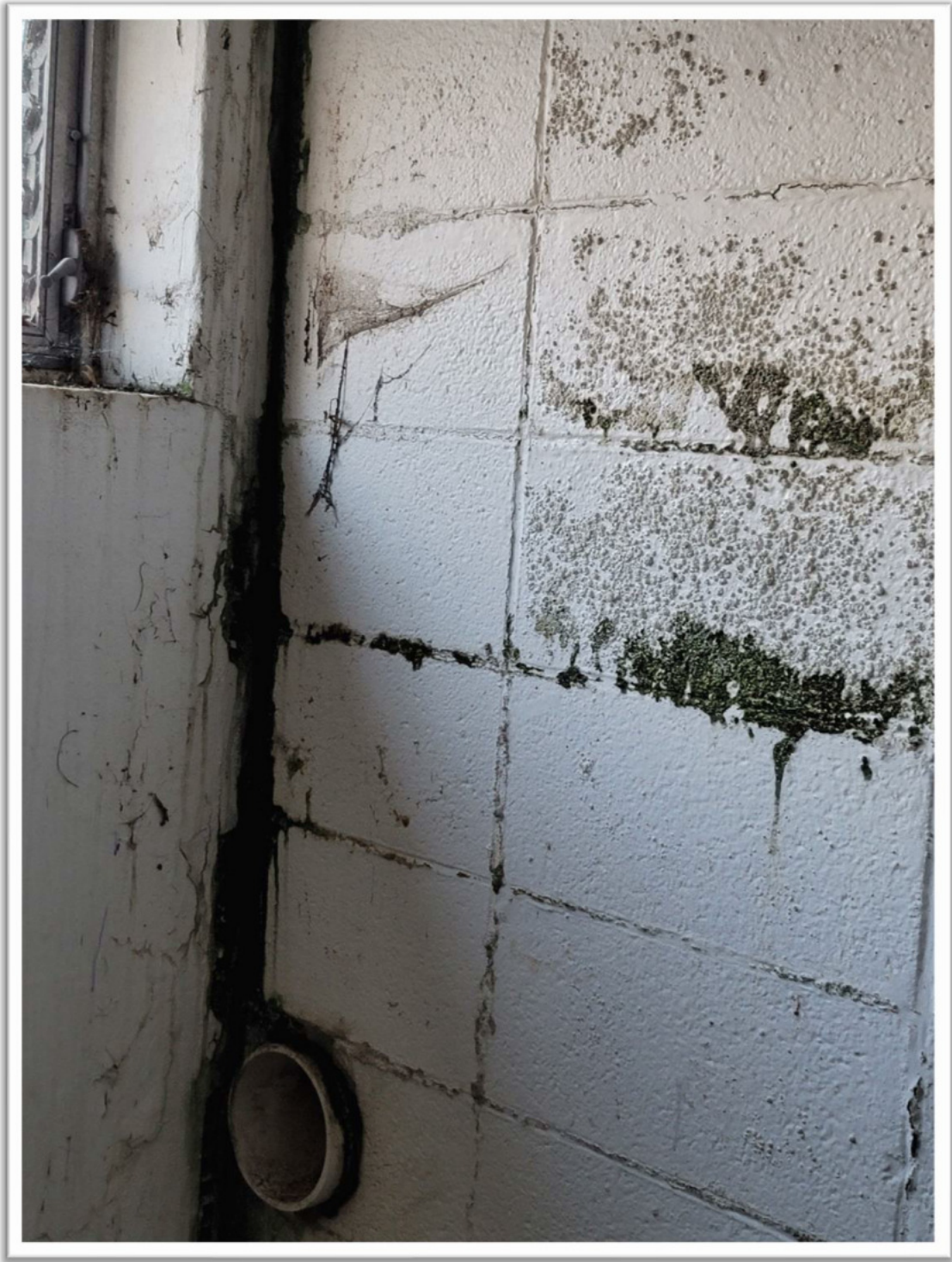


Figure 3.30 - Efflorescence deposits from moisture intrusion.



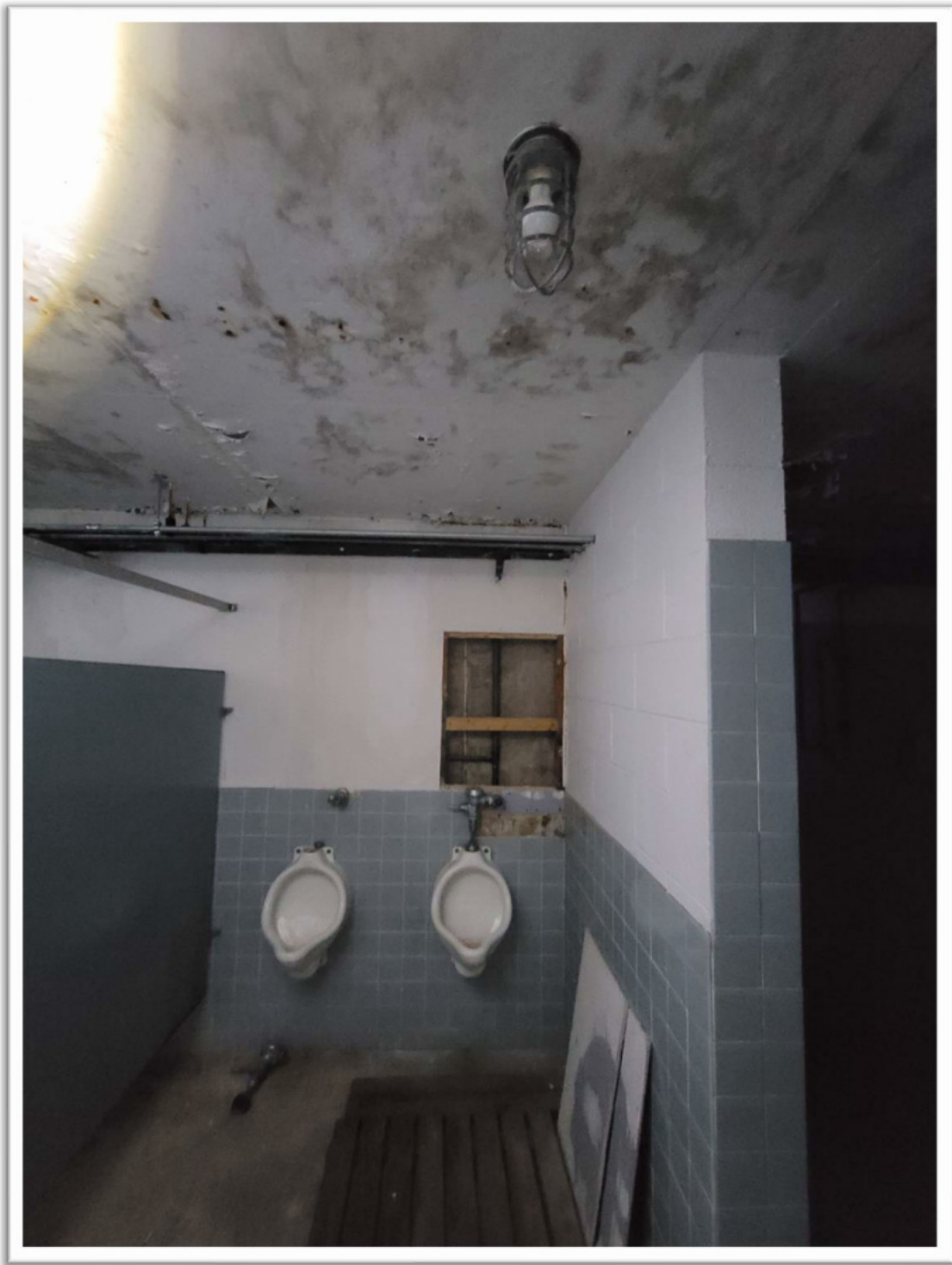


Figure 3.31 - Mold through the ceiling due to high moisture content.



Figure 3.32 - Mold through the ceiling due to high moisture content.

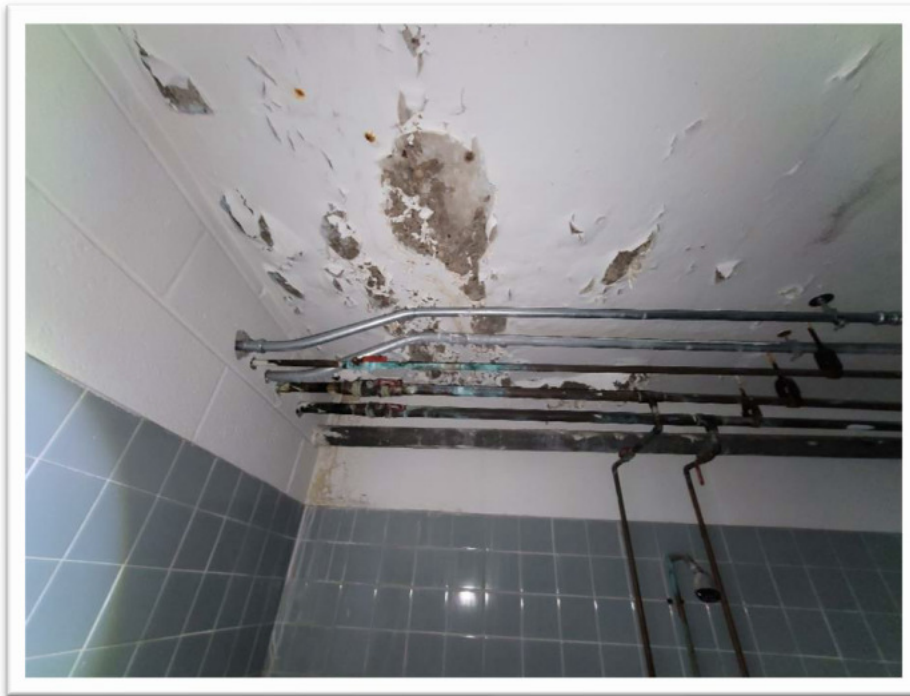


Figure 3.33 - Peeled painting through the ceiling from moisture damage.



Figure 3.34 - Exposed and spalling concrete surface due to moisture damage.





Figure 3.35 - Peeled painting through the ceiling from moisture damage.



Figure 3.36 - Exposed and spalling concrete surface due to moisture damage.

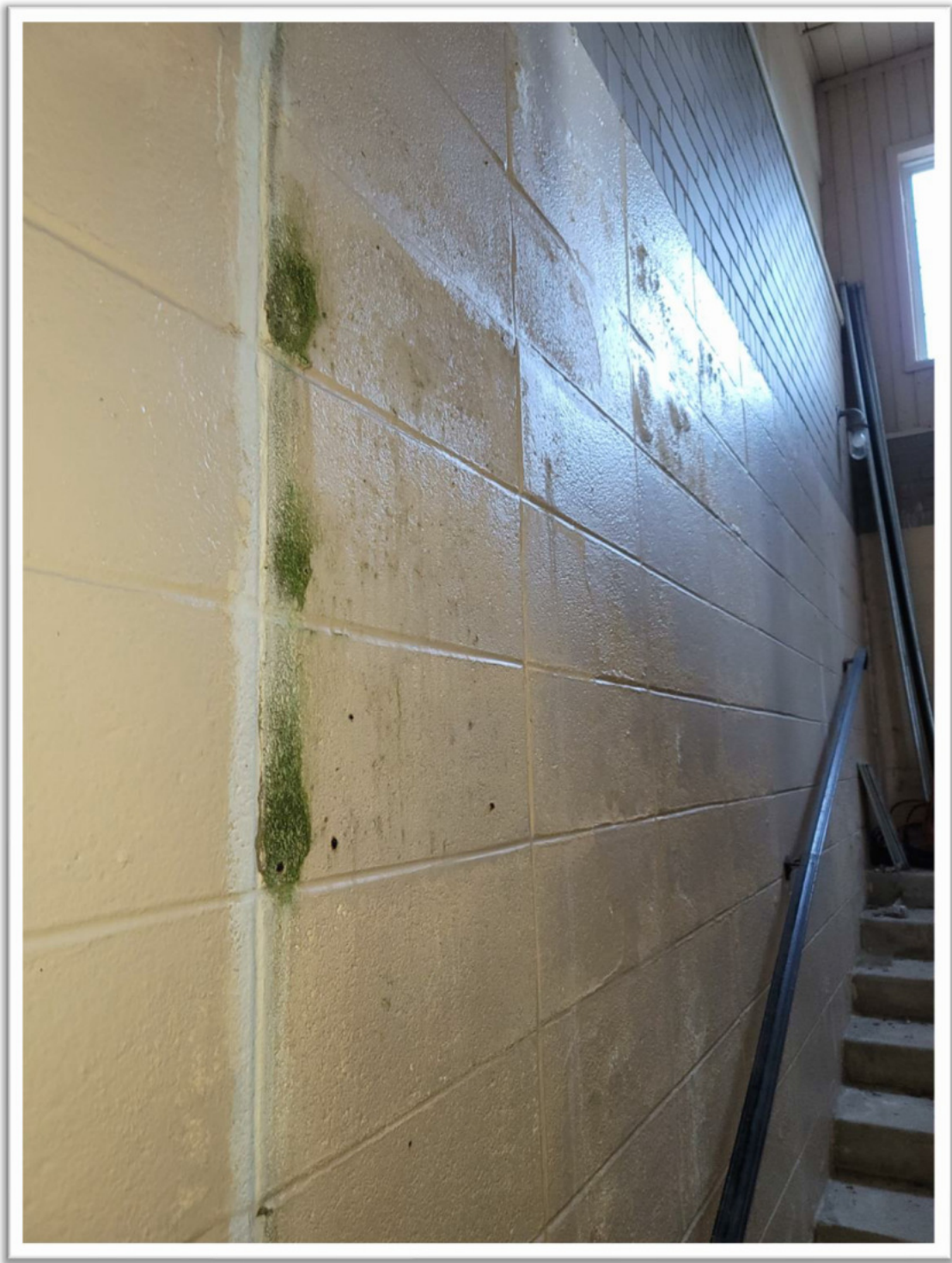


Figure 3.37 - Moisture stains.



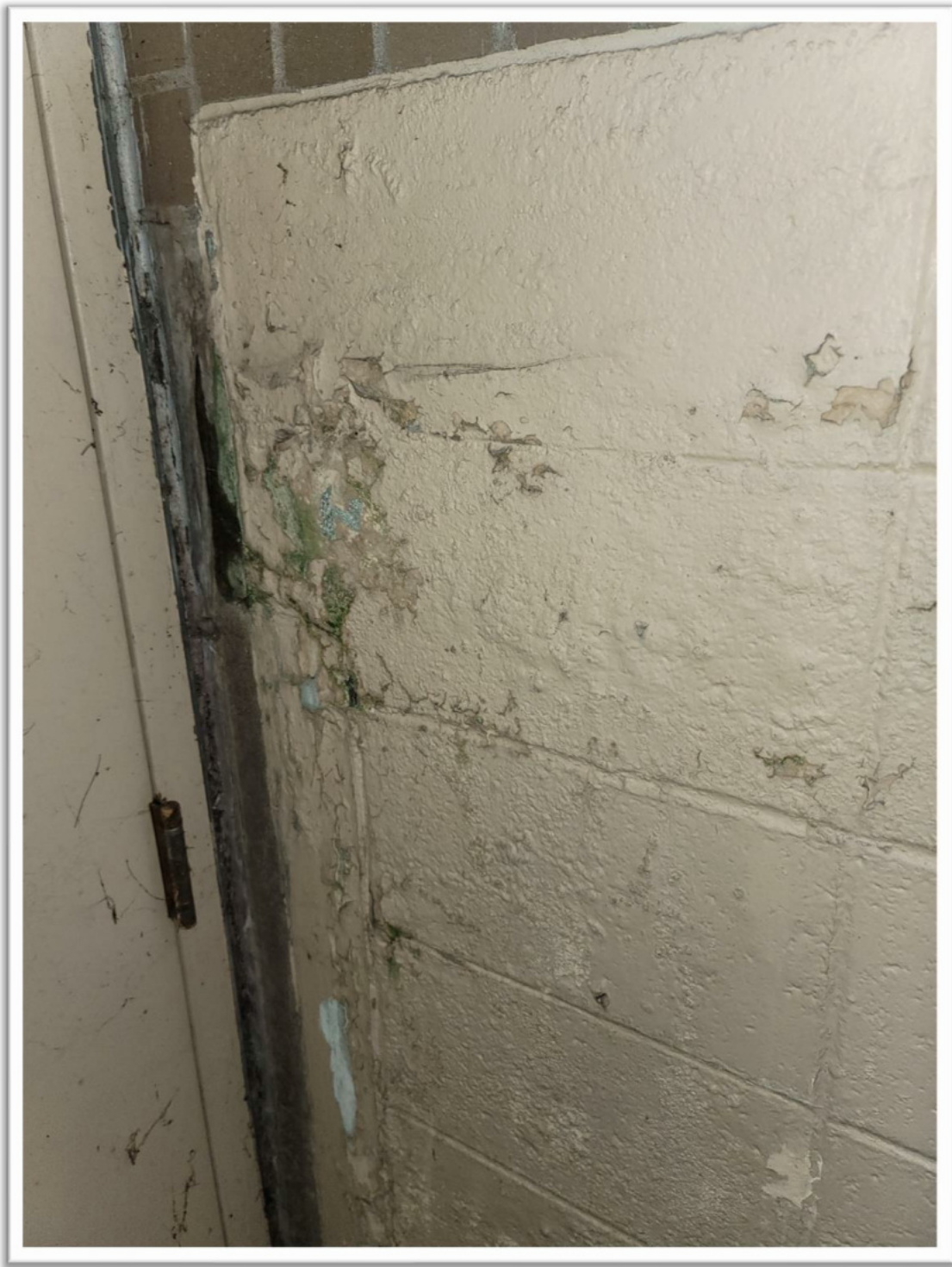


Figure 3.38 - Efflorescence deposits and moisture stains..



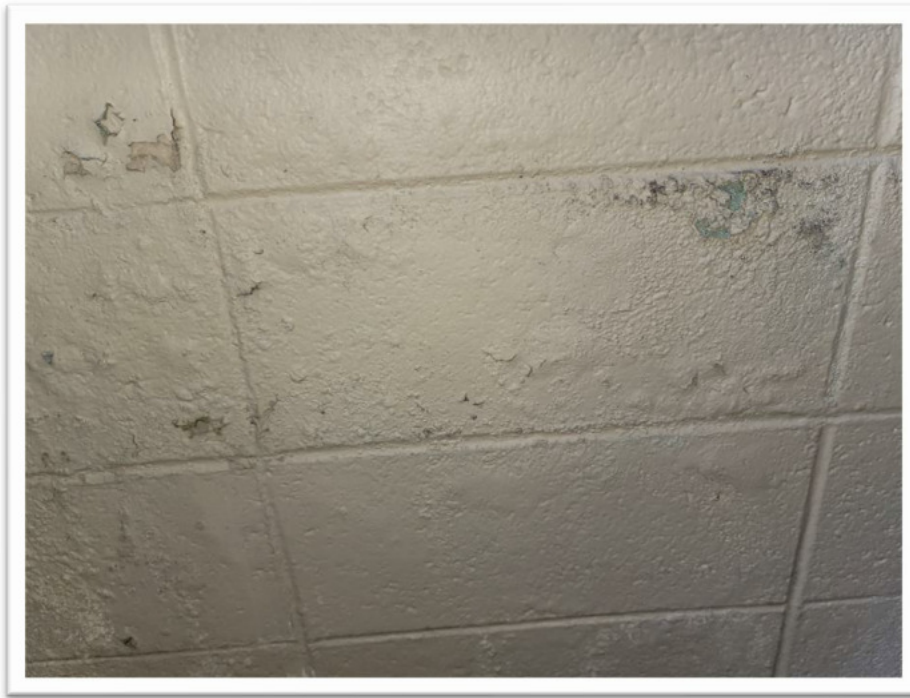


Figure 3.39 - Peeled painting and efflorescence deposits.



Figure 3.40 - Poor roofing drainage.

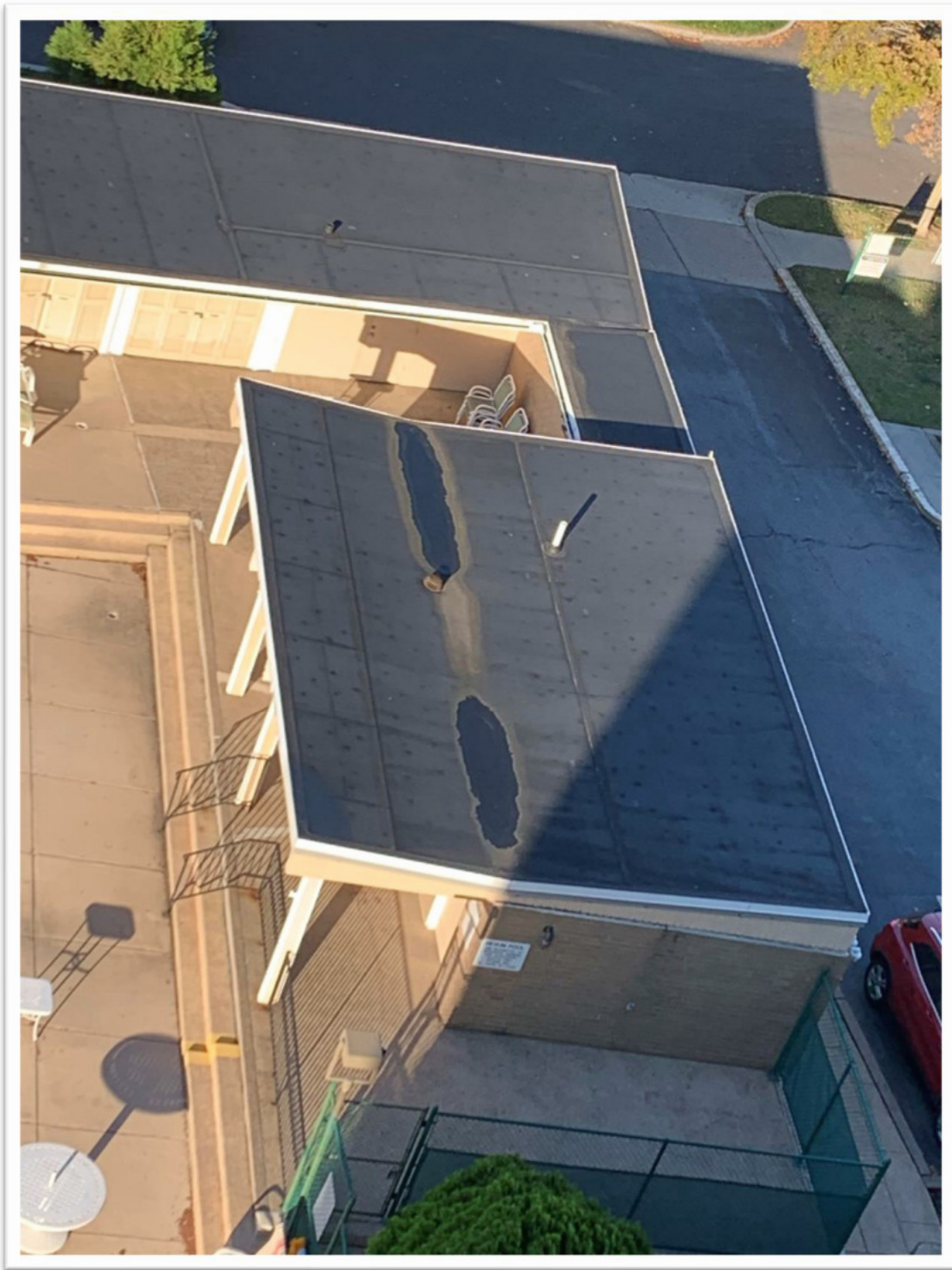


Figure 3.41 - Poor roofing drainage.



Figure 3.42 - Peeled painting to the fascia beam.



Figure 3.43 - Rot damage.



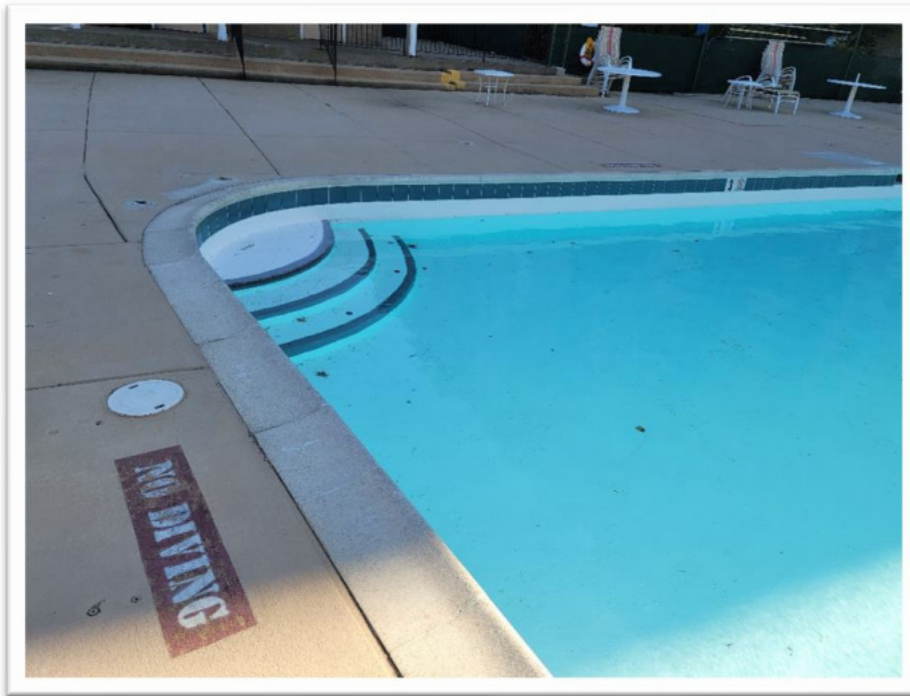


Figure 4.1 - Swimming Pool



Figure 4.2 - Swimming Pool



Figure 4.3 - Swimming Pool



Figure 4.4 - Swimming Pool



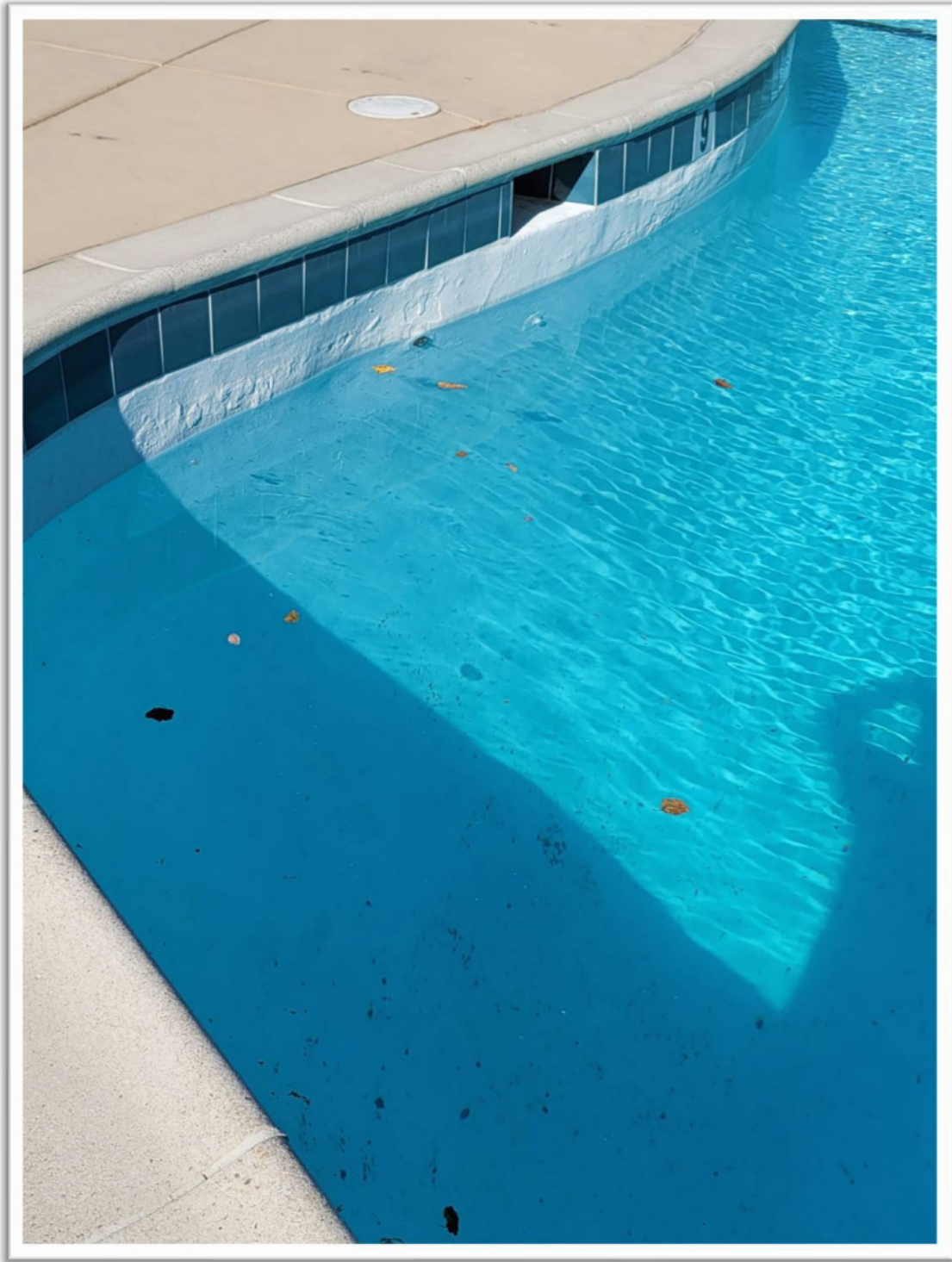


Figure 4.5 - Poor waterline tiles and peeled pool walls.





Figure 4.6 - Poor waterline tiles and peeled pool walls.

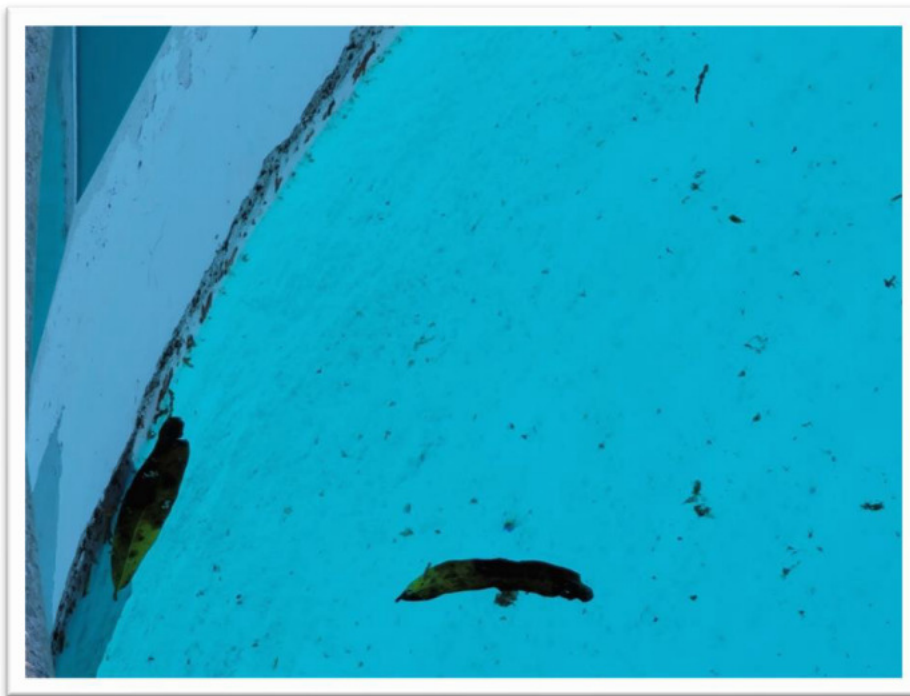


Figure 4.7 - Poor waterline tiles and peeled pool walls.



Figure 4.8 - Poor waterline tiles and peeled pool walls.

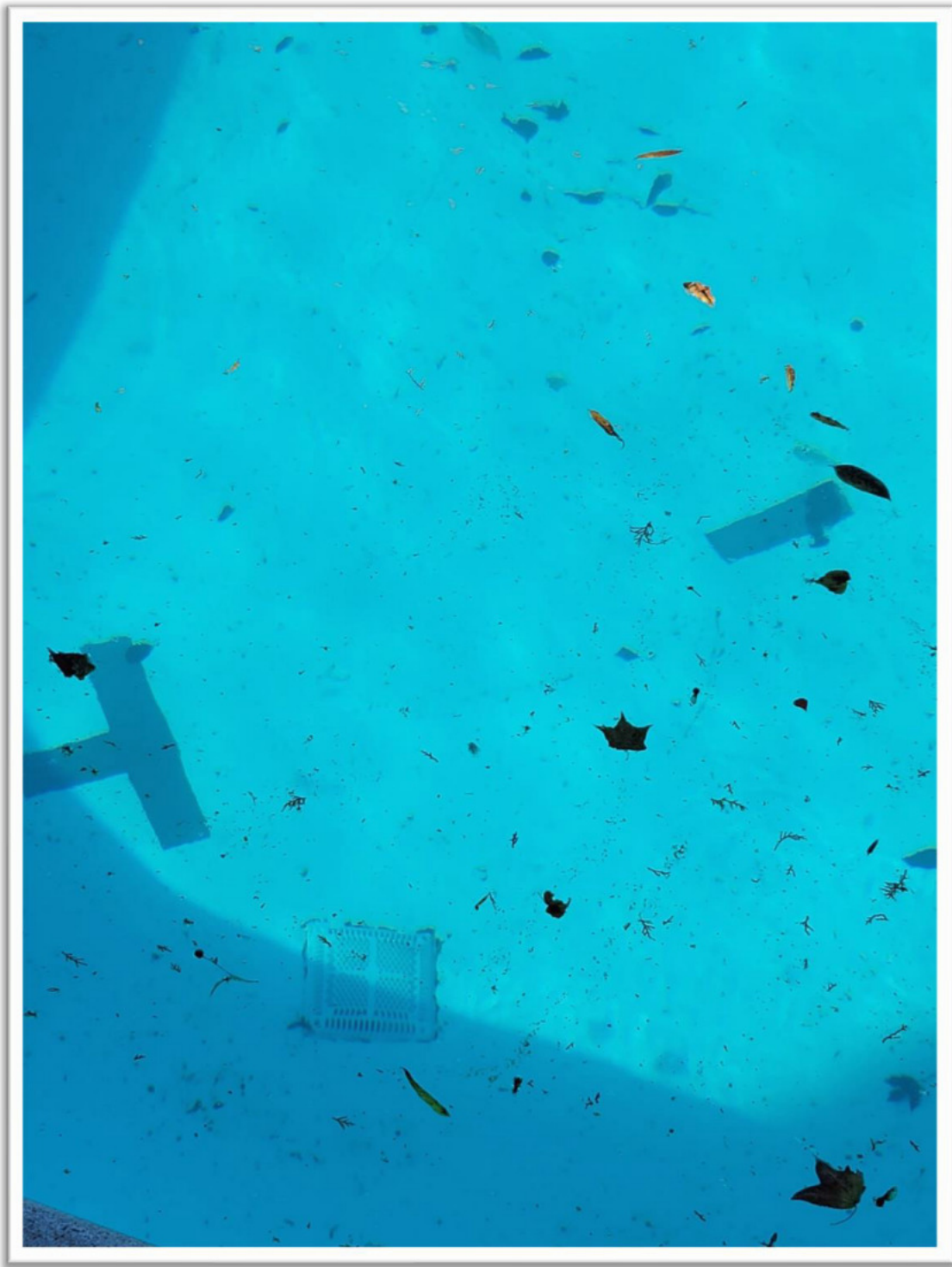


Figure 4.9 - Cracks in the pool flooring.





Figure 4.10 - Poor Sealant around the coping.

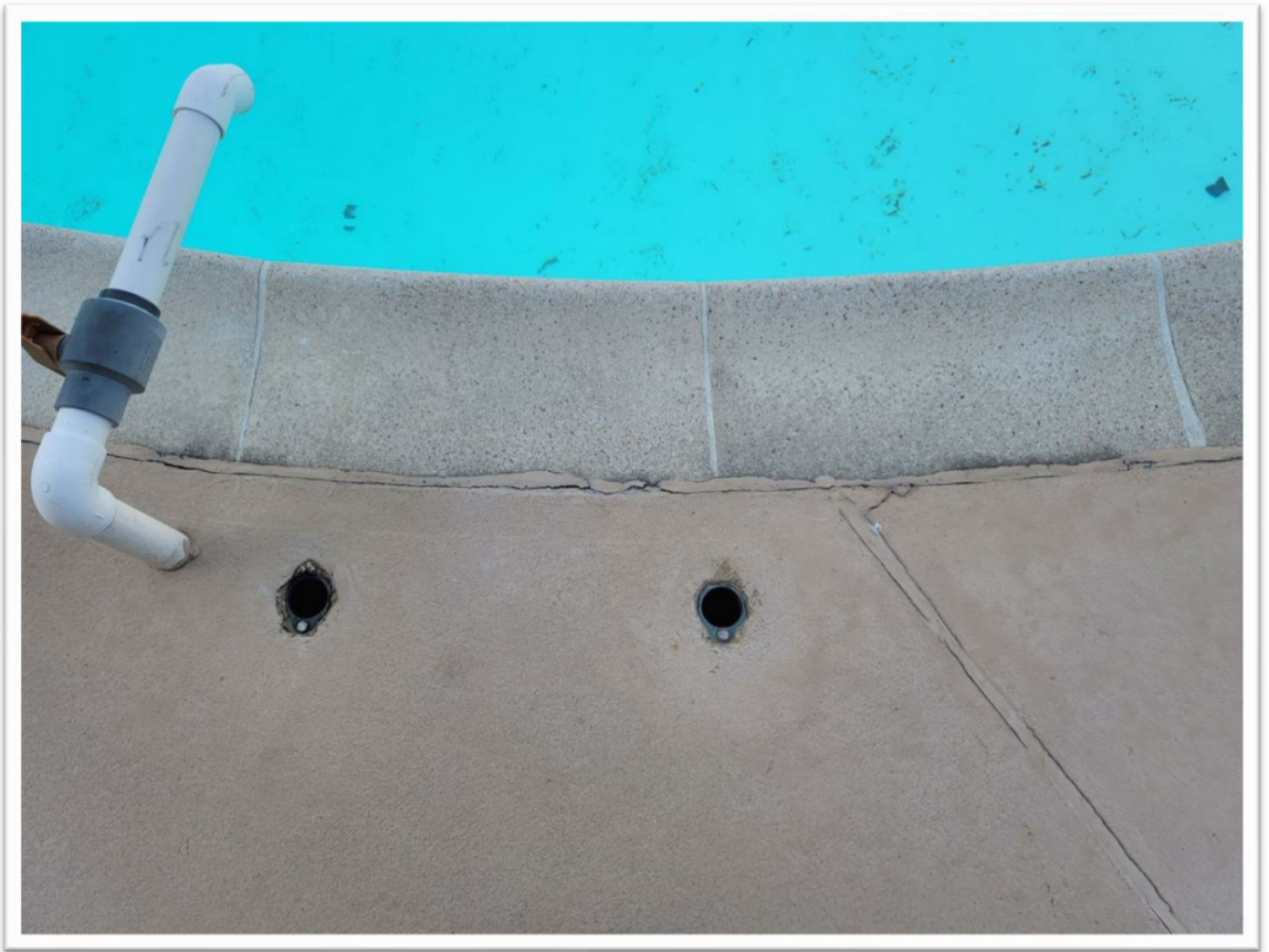


Figure 4.11 - Poor Sealant around the coping.

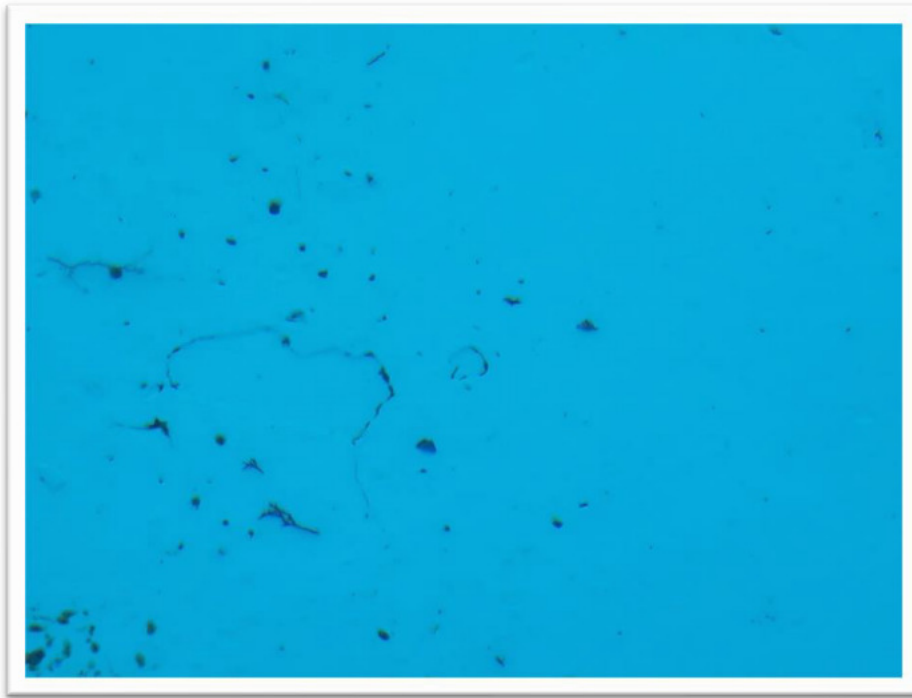


Figure 4.12 - Cracks in the pool flooring.



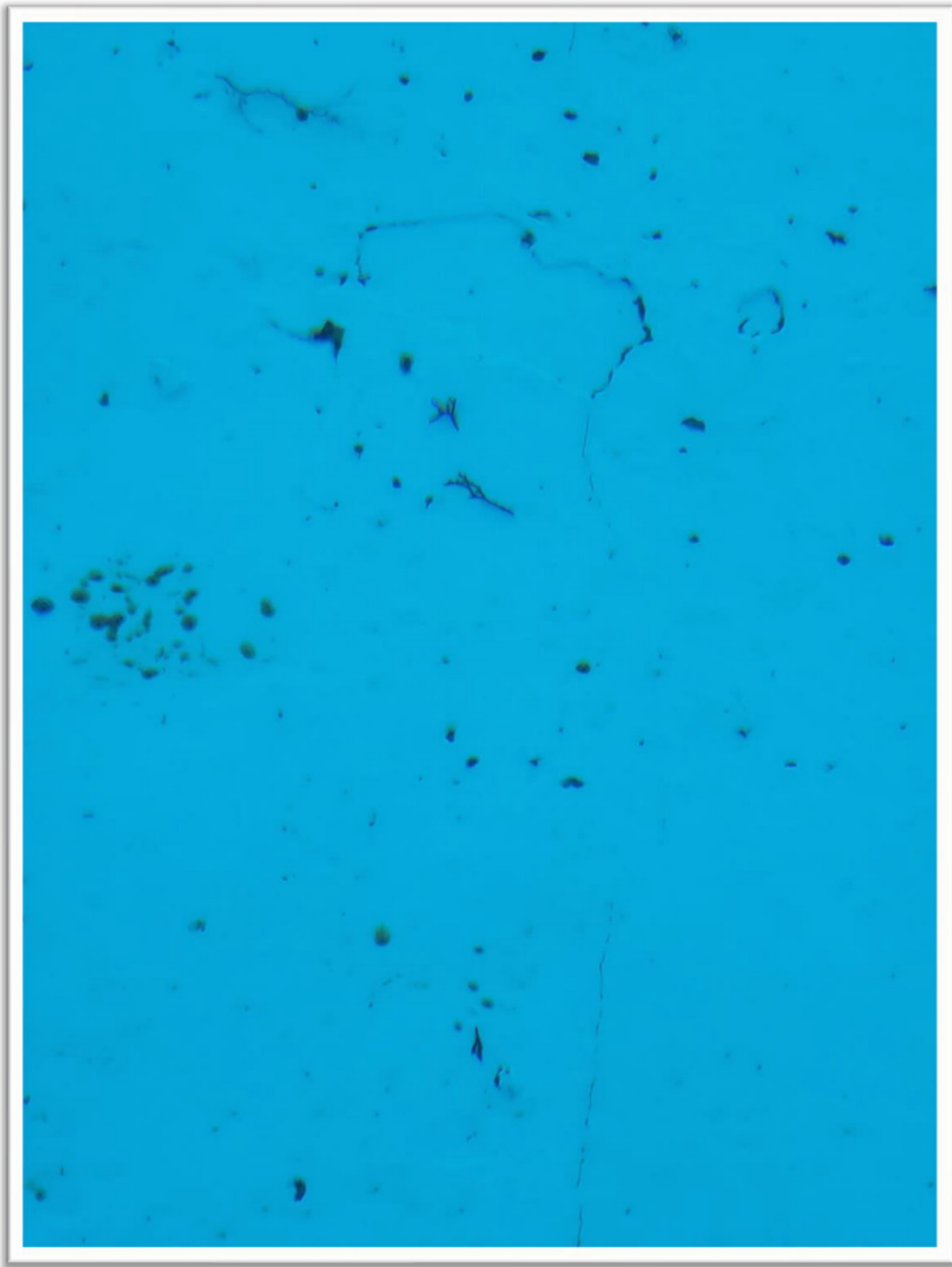


Figure 4.13 - Cracks in the pool flooring.