



**LYCÉE LOUIS
MASSIGNON**
ليسيه لوي مسينيون

ÉTABLISSEMENT
EN GESTION DIRECTE



aefe
Agence pour
l'enseignement français
à l'étranger

RENOVATION OF BLOCK B' FOR FRENCH SCHOOL (LYCEE LOUIS MASSIGNON)

CONCRETE REPAIRS AND STRUCTURAL REINFORCEMENT

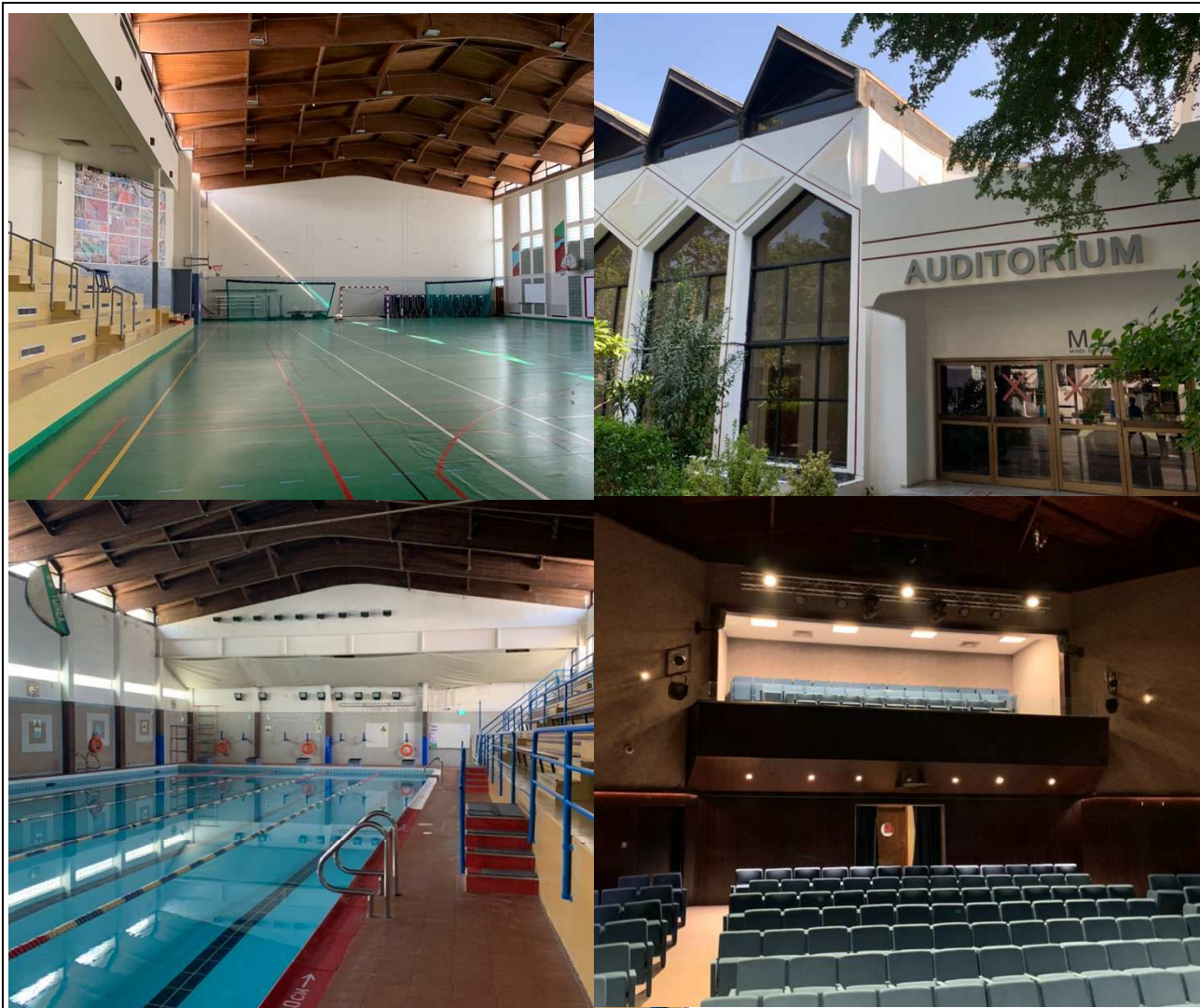
**PLOT (26_27), SECTOR (E40)
ABU DHABI ISLAND
EMIRATE OF ABU DHABI
UNITED ARAB EMIRATES**

**VOLUME 5 – Part 3 of 7
M/s Apave International
Report Auh/CI21.127-v1 dated December 2021**

HP Project No. 1782

**Revision 1
April 18th, 2025**

Structure Condition Assessment (Concrete Part)



Gymnasium, Swimming Pool and Auditorium

Client: Lycée Louis Massignon

Location: Lycée Louis Massignon School in Abu Dhabi, U.A.E.

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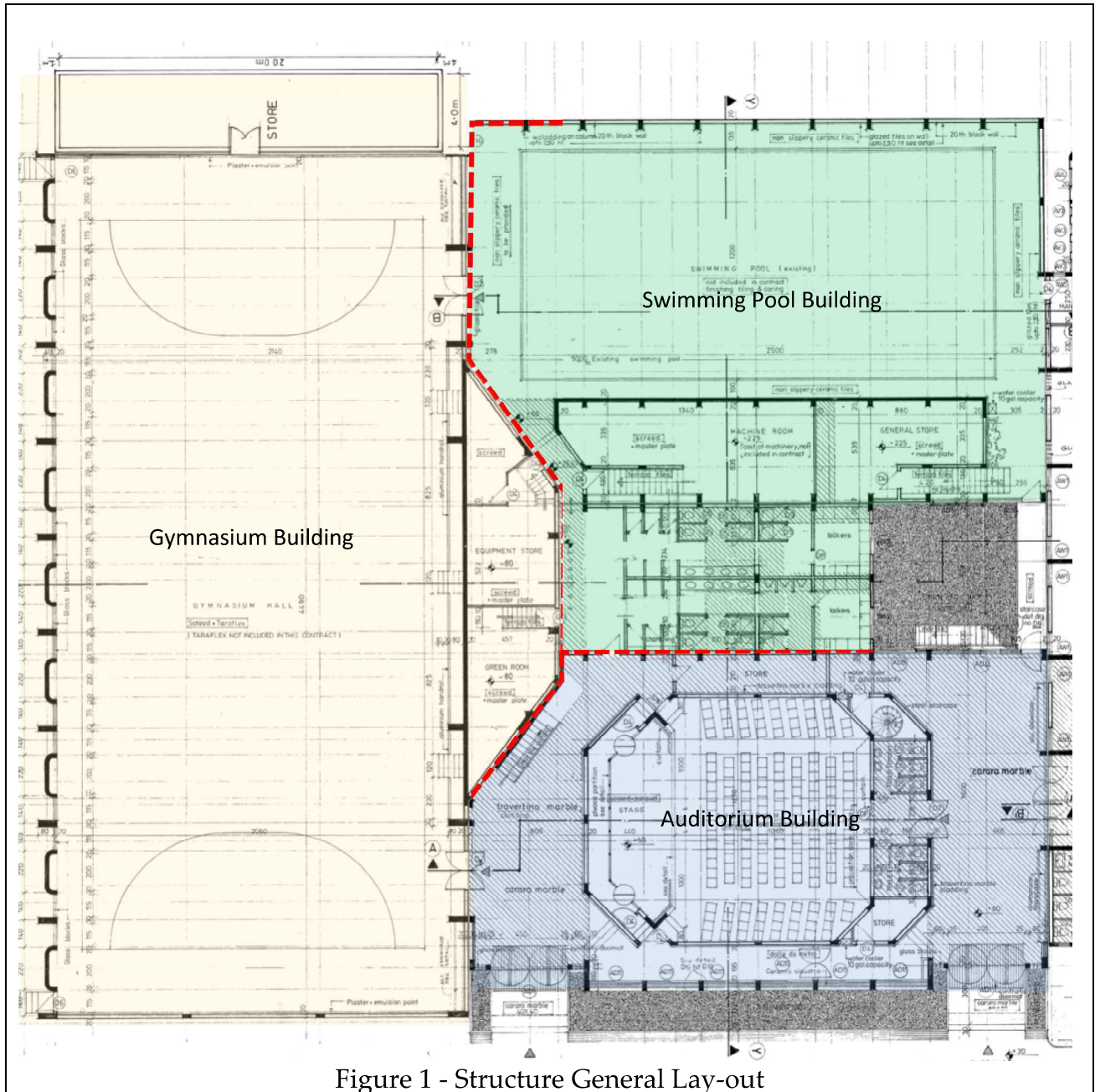
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1. INTRODUCTION

The concerned structures are owned by Lycée Louis Massignon and is located in Abu Dhabi, U.A.E. The structures namely (1) Gymnasium Building, (2) Swimming Pool Building and (3) Auditorium Building are consisted of reinforced concrete frame and wooden roofing. This investigation concerns the reinforced concrete part of the structure.



2. METHODOLOGY

The purpose of this assessment is to conduct a full visual inspection of the concrete part of the structures to locate the cracks which are deemed to be significant and require monitoring. Moreover, crack gauge meters have been installed in order to monitor the movement or development of cracks.

Access Means:

The full visual inspection was conducted using different access tools in order to assess the condition of the structures properly. Scaffoldings and ladders, whenever practically possible to set-up, allows inspection at a close-up distance. For the locations where access is difficult, binocular has been utilized in order to assess the concrete conditions. In addition, false ceilings have been temporarily removed at selected locations in order to expose the concrete conditions of the beams and slabs soffits which are covered by the false ceilings.



Figure 2 - Means of Access

Inspection Methods:

Different inspection technics and tools had been used in order to assess any defects. Below table shows typical defects and the related typical inspection methods to identify defects.

Type of Defects	Typical Inspection Method	Tools/Instrument
Cracks	Visual check, measurement of crack width	Crack Comparator, feeler gauge, meter
Spalling	Visual Check, Hammer tapping	Hammer
Water Leakage/Efflorescence	Visual Check	n/a
Delamination	Visual Check, Hammer tapping	Hammer
Scalling	Visual Check, Hammer tapping	Hammer
Honeycomb	Visual Check, Hammer tapping	Hammer
Staining/Discoloration	Visual Check, Hammer tapping	n/a
Deteriorated Protective Paint	Visual Check	n/a

Crack Monitoring:

A G1+ Gauges has been used to monitor cracks. This type of gauge is suitable for monitoring parallel lip crack progressing along a single axis. With 1/20mm precision, this crack will capture crack movements up to 0.5mm. Refer to Appendix E for gauge technical datasheet.

3. STRUCTURE DESCRIPTION

Structure Name: Gymnasium Building

Type of Construction Material: Concrete Construction / Wooden Roofing

Date of Construction: not defined



Gymnasium Building

Structure Name: Swimming Pool Building

Type of Construction Material: Concrete Construction / Wooden Roofing

Date of Construction: not defined



Swimming Pool Building

Structure Name: Auditorium Building

Type of Construction Material: Concrete Construction / Wooden Roofing

Date of Construction: not defined



Auditorium Building

4. EXECUTIVE SUMMARY

There are number of defects (more than 50) which were observed during the conduction of the assessment.

Thirteen (13), crack monitoring gauges were installed and is recommended to be monitored every 6 months (refer to section 6 – Crack Monitoring).

Some of the defects are deemed to be critical and require immediate action/attention: observation numbers: 3, 5, 6, 13, 14, 27, 29, 31, 32, 34, 35, 36, 39, 40, 44 and 51.

Some of those defects shows a degraded concrete beam / spalling slabs as show in below photographs (Refer to section 5 – Inspection Findings and recommendations for more details).



Some of Defect Photos

5. INSPECTION FINDINGS AND RECOMMENDATIONS

Obs.No.	Location	Defect	Recommendation
1	Gymnasium Building (multiple locations as shown in defect location)	-Horizontal cracks on wall -Crack width was not measured as some fixtures does not allow close-up inspection of the defect.	- to be visually monitored yearly to check any visually observable abnormalities
2	Gymnasium Building (on the bleacher)	-Vertical cracks on wall -crack meters have been installed (Gauge number: LLM_APV_04 and LLM_APV_05)	-crack meter movement to be monitored every 6 months
3	Gymnasium Building (bleacher)	Cracks on the Bleacher -the cracks are appearing on both bottom and upper phase of concrete bleachers -crack gauges have been installed (Gauge Number: LLM_APV_06 and LLM_APV_07)	-to be repaired & crack meter movement to be monitored every 6 months
4	Gymnasium Building (as shown in the defect location)	-Vertical Crack in junction between column and beam -crack width = 0.45mm	-to be repaired
5	Gymnasium Building (as shown in the defect location)	Vertical Crack at junction between walls -the crack is at the critical junction between the walls -the crack is visible at both side of the wall -crack meter has been installed (Gauge Number: LLM_APV_01)	-to be repaired & crack meter movement to be monitored every 6 months
6	Gymnasium Building (at the store area)	Horizontal Crack at wall -the crack is at the critical location as the wall is suspended -crack meter has been installed (Gauge Number: LLM_APV_02 and LLM_APV_03)	-to be repaired & crack meter movement to be monitored every 6 months
7	Gymnasium Building (at the store area)	Crack =0.3mm and concrete spalling on wall and column	-to be repaired
8	Gymnasium Building (ladies toilet, store room, men's changing room)	Vertical Crack on wall -maximum crack width is 4mm -crack gauge meter has been installed (Gauge Number: LLM_APV_10)	-to be repaired & crack meter movement to be monitored every 6 months
9	Concrete spalling	Auditorium Building (as shown in defect location)	-to be repaired
10	Auditorium Building (as shown in defect location)	Crack on wall underneath the wooden girder	-to be repaired

Obs.No.	Location	Defect	Recommendation
		-vertical crack on wall width <0.2mm	
11	Gymnasium Building (roof)	-Cracks on wall and column which is supporting the wooden girder -multiple cracks, w=0.5mm	-to be repaired
12	Gymnasium Building (roof)	-Cracks at junction between wall and column/beam	-to be repaired
13	Gymnasium Building (roof)	-Cracks, Exposed Corroded Rebar and concrete scalling on diagonal beams	-to be repaired
14	Gymnasium Building (roof)	Concrete Spalling and Exposed Corroded Rebars	-to be repaired
15	Gymnasium Building (roof)	Concrete Spalling, cracks in junction between column and wall, poor protective paint condition	-to be repaired
16	Auditorium Building (roof – as shown in defect location)	-Crack in between wall and beam -multiple cracks ranging from >0.2mm to 0.4mm	-to be repaired
17	Auditorium Building (roof – as shown in defect location)	-Vertical Crack on wall w=0.35mm	-to be visually monitored yearly to check any visually observable abnormalities
18	Auditorium Building (roof – as shown in defect location)	Concrete Crack/Spalling and Poor Protective paint condition	-to be repaired
19	Auditorium Building (roof – as shown in defect location)	-Multiple Cracks in Auditorium Wall -crack ranging from >0.2mm to 0.4mm	-to be repaired
20	Auditorium Building (roof – as shown in defect location)	-Cracks in Auditorium Wall + stair + Poor Protective paint Quality -the crack on wall is ranging from >0.2mm to 0.3mm	-to be repaired
21	Auditorium Building (as shown in defect location)	Cracks in Auditorium Wall and Ceiling (multiple locations) -crack width = 0.8mm -crack meter gauge has been installed to monitor if the cracks are developing/moving (LLM_APV_09)	-to be repaired & crack meter movement to be monitored every 6 months
22	Auditorium Building (external wall - as shown in defect location)	Cracks in Auditorium Wall and Ceiling -crack<0.2mm	-to be monitored yearly to check any abnormalities
23	Swimming Building (bleacher underside)	Multiple cracks on bleacher underside - w < 0.2mm	-to be visually monitored yearly to check any visually observable abnormalities
24	Swimming Building (bleacher underside)	Cracks on concrete stair	-to be repaired

Obs.No.	Location	Defect	Recommendation
25	Swimming Building (as shown in defect location)	-Crack in concrete Flooring - the gap also appear at the underneath junction between column/beam and wall	-to be repaired
26	Swimming Building (as shown in defect location)	-Crack on top of the wall -crack width cannot be measured due to access limitation	-to be repaired
27	Swimming Building (as shown in defect location)	-Horizontal Crack was observed on concrete above the steel girder (both of the girders on two end sides of the pool structure) -cracks were also observed on concrete above the steel beam near its connection -at the time of inspection, the swimming pool is full with water which does not allow a close-up inspection and gauge installation.	-to be repaired
28	Swimming Building (as shown in defect location)	-Horizontal Crack were observed in exterior wall in swimming pool building -there are no signs of water leakage at the time of inspection -the wall is delaminated at some locations -the crack width = 0.5mm -crack meter gauge has been installed (Gauge Number: LLM_APV_12)	-to be repaired
29	Swimming Building (as shown in defect location)	-Cracks on concrete column supporting the wooded roof (2 columns) -at the time of inspection, the swimming pool is full with water which does not allow a close-up inspection and gauge installation.	-to be repaired
30	Swimming Building (as shown in defect location)	-Horizontal cracks on concrete wall, w=0.3mm	-to be visually monitored yearly to check any visually observable abnormalities
31	Gymnasium Building (entrance - as shown in defect location)	-Concrete Spalling with Exposed Corroded Rebar (Beam)	-to be repaired
32	Gymnasium Building (entrance - as shown in defect location)	-Concrete Spalling with Exposed Corroded Rebar (slab)	-to be repaired

Obs.No.	Location	Defect	Recommendation
33	Gymnasium Building (entrance - as shown in defect location)	-Crack < 0.2mm -calcite deposit was observed (dry at inspection time)	-to be repaired
34	Auditorium Building (as shown in defects location)	-unfilled concrete grout on columns (for timber support) -crushed/cracked beams supporting the window for roofing	-to be repaired
35	Auditorium Building (as shown in defects location)	-concrete spalling and cracks on concrete beam and wall -exposed corroded rebars	-to be repaired
36	Auditorium Building (as shown in defects location)	-concrete spalling with exposed corroded rebar	-to be repaired
37	Auditorium Building (attic)	-minor cracks < 0.2mm, horizontal cracks	-to be visually monitored yearly to check any visually observable abnormalities
38	Auditorium Building (roof level)	-diagonal crack on wall, width = 0.9mm -crack meter has been installed (Gauge Number: LLM_APV_11)	-to be repaired & crack meter movement to be monitored every 6 months
39	Swimming Pool Building (roof level)	-concrete crack/spalling on wall	-to be repaired
40	Swimming Pool Building (roof level)	-damaged termination of water proofing membrane	-to be repaired
41	Gymnasium Building (underside of bleacher)	-horizontal cracks appearing on wall and columns at the same level in a room -crack monitoring gauge has been installed (Gauge Number: LLM_APV_08)	-to be repaired & crack meter movement to be monitored every 6 months
42	Gymnasium Building (underside of bleacher)	- cracks appearing on the surface of newly repaired concrete -Crack gauge meter has been installed (Gauge Number: LLM_APV_13)	-crack meter movement to be monitored every 6 months
44	Gymnasium Building (on the road side)	-cracks in columns and beams -inspected using binocular due to access limitation	-to be repaired
45	Gymnasium Building (on the road side)	Degraded paint on exterior part of gymnasium	-to be repaired
46	Gymnasium Building (corner column at the exit towards the road)	-Concrete spalling / crack, w=0.4mm	-to be repaired
47	Gymnasium Building (corner column at the exit towards the road)	Concrete crack at the junction between column and wall , w=0.3mm	-to be visually monitored yearly to check any visually observable abnormalities

Obs.No.	Location	Defect	Recommendation
48	Gymnasium Building (corner column at the exit towards the road)	-Crack on Column starting to appear on the plaster -Inspected using binocular due to access limitation	-to be repaired -during repair, the structural column behind the decorative plaster shall be assess for any cracks
49	Auditorium Building (roof level as shown in defect location)	Crack on parapet wall, crack width = 1.0mm	-to be repaired
50	Auditorium Building (female toilet)	Crack on column and beam, width<0.45mm	-to be repaired
51	Auditorium Building (corner column at the exit towards the road)	-Degraded Concrete (crushed)	-to be repaired
52	Auditorium Building (as shown in defect location)	-Dampness/traces of leakage on wall	-to be repaired
53	Auditorium Building (store room)	Crack on ceiling and beam, width<0.2mm	-to be monitored yearly
54	Auditorium Building (male toilet)	Crack on ceiling and beam, width<0.2mm	-to be monitored yearly
55	Auditorium Building (female toilet)	Crack on ceiling and beam, width<0.2mm	-to be monitored yearly

6. CRACK GAUGE MONITORING

G. No.	Location	Crack Gauge Monitor		Crack Width Measurement		Remarks
		Current Reading	Deviation	Current Measurement	Deviation	
1	Gymnasium Building	31.10	-	2.50 mm	-	-Refer to obs.no.5 -the crack is at critical junction between the wall and column. -A crack meter has been installed to determine if the crack is still developing/ moving.
2	Gymnasium Building	28.20	-	1.50 mm	-	-Refer to obs.no.6 -the crack is at critical location as the wall is suspended. -a crack meter has been installed to determine if the crack is still developing/ moving.
3	Gymnasium Building	29.45	-	0.65 mm	-	-Refer to obs.no.6 -the crack is at critical location as the wall is suspended. -a crack meter has been installed to determine if the crack is still developing/ moving.
4	Gymnasium Building	34.00	-	0.50 mm	-	-Refer to obs.no.2 -as the crack are nearby the bleacher which are seen to have developing cracks even after repair, crack meters have been placed to check if there is any movement/ or crack development on the bleacher location
5	Gymnasium Building	28.30	-	0.50 mm	-	-Refer to obs.no.2 -as the crack are nearby the bleacher which are seen to have developing cracks even after repair, crack meters have been placed to check if there is any movement/ or crack development on the bleacher location

G. No.	Location	Crack Gauge Monitor		Crack Width Measurement		Remarks
		Current Reading	Deviation	Current Measurement	Deviation	
6	Gymnasium Building	29.95	-	0.40 mm	-	-Refer to obs.no.3 -It has been noticed that the bleacher was recently repaired. However, even after repair, new cracks are appearing. Crack gauge meter has been installed in this crack to monitor its development.
7	Gymnasium Building	29.05	-	0.95 mm	-	-Refer to obs.no.3 -It has been noticed that the bleacher was recently repaired. However, even after repair, new cracks are appearing. Crack gauge meter has been installed in this crack to monitor its development.
8	Gymnasium Building	30.60	-	0.60 mm	-	-Refer to obs.no.41 -the crack is appearing at the same level in a room affecting the wall and columns. This is on the same location of the bleacher where cracks are being monitored.
9	Auditorium Building	28.60	-	0.75 mm	-	Refer to obs.no.21 -The cracks are appearing on wall and ceiling at the same line/location. A crack gauge meter has been installed to further monitor the development of these cracks
10	Gymnasium Building	28.25	-	4.00 mm	-	Refer to obs.no.8 -Number of vertical cracks has been observed on the exterior wall. A gauge meter has been installed in order to determine if those cracks are still developing.
11	Auditorium Building	30.00	-	0.90 mm	-	Refer to obs.no.38 -A diagonal crack on the wall with w=0.9mm. A crack gauge meter has been installed to check further development of the crack

G. No.	Location	Crack Gauge Monitor		Crack Width Measurement		Remarks
		Current Reading	Deviation	Current Measurement	Deviation	
12	Swimming Pool Building	26.05	-	0.60 mm	-	Refer to obs.no.28 -The cracks are appearing on wall and column at the same line/location. A crack gauge meter has been installed to further monitor the development of these cracks
13	Gymnasium Building	29.15	-	0.30 mm	-	Refer to obs.no.42 -It has been noticed that the column and wall underneath the bleacher were recently repaired. However, even after repair, new cracks are appearing. Crack gauge meter has been installed in this crack to monitor its development.

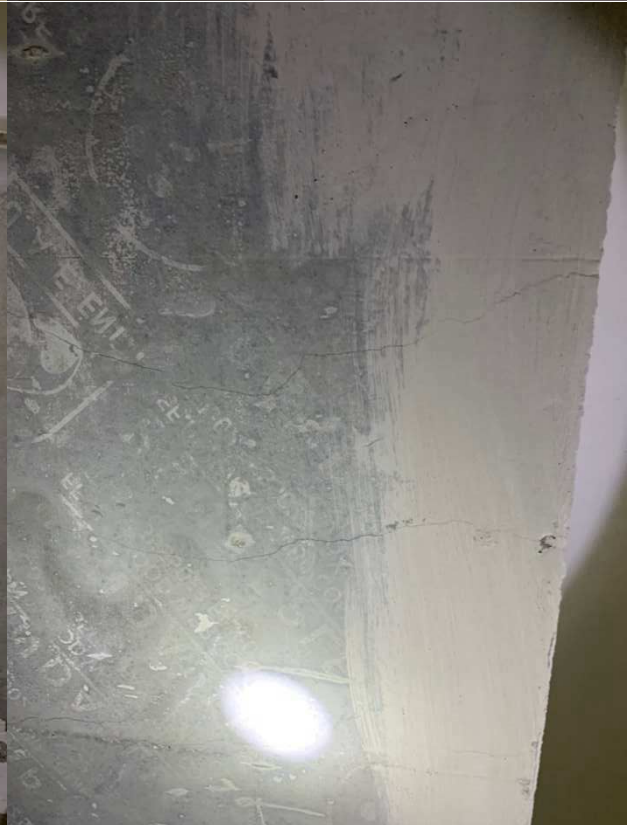
Refer to Appendix B for the crack monitoring gauge documentation/photos.

It is recommended that the movement of the cracks will be monitored every 6 months.

APPENDIX A – INSPECTION PHOTOS

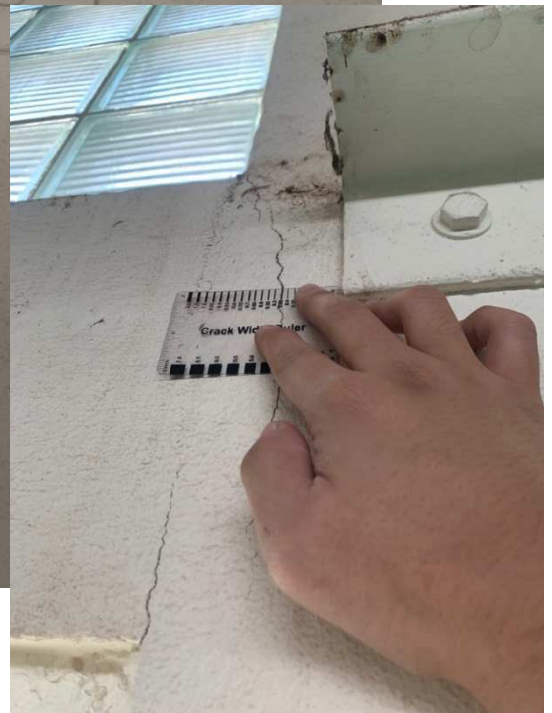






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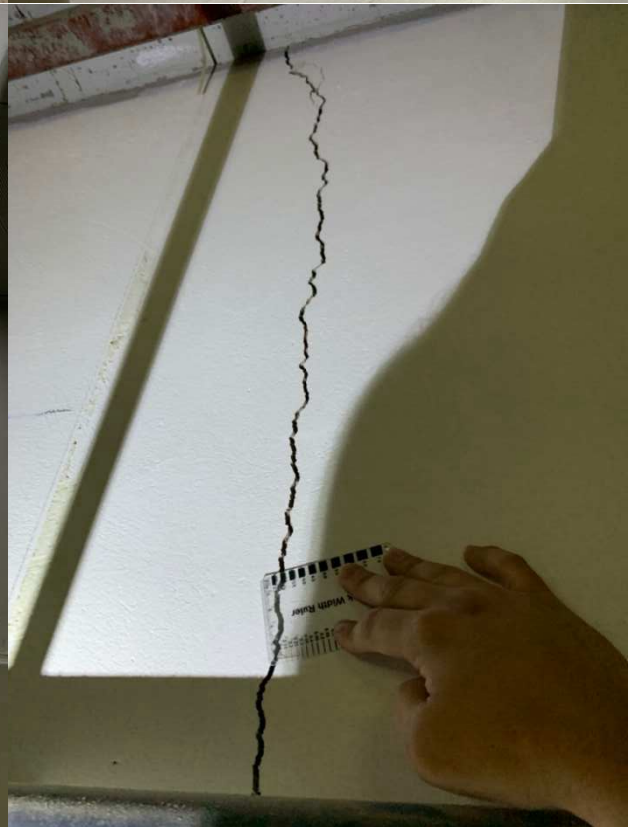






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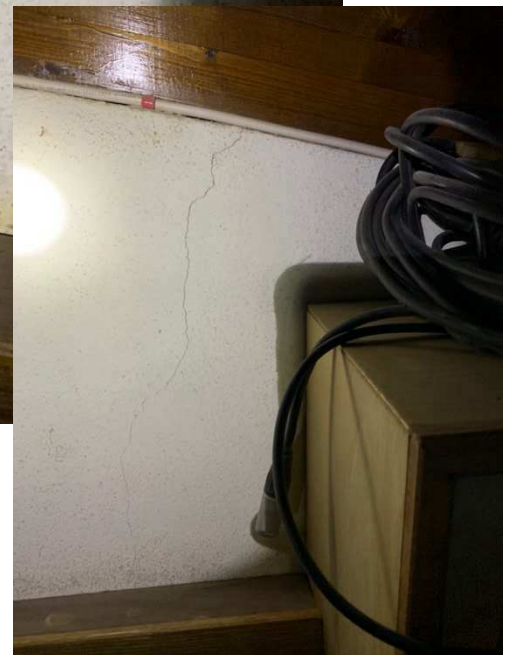
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Obs. No.

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Obs. No.

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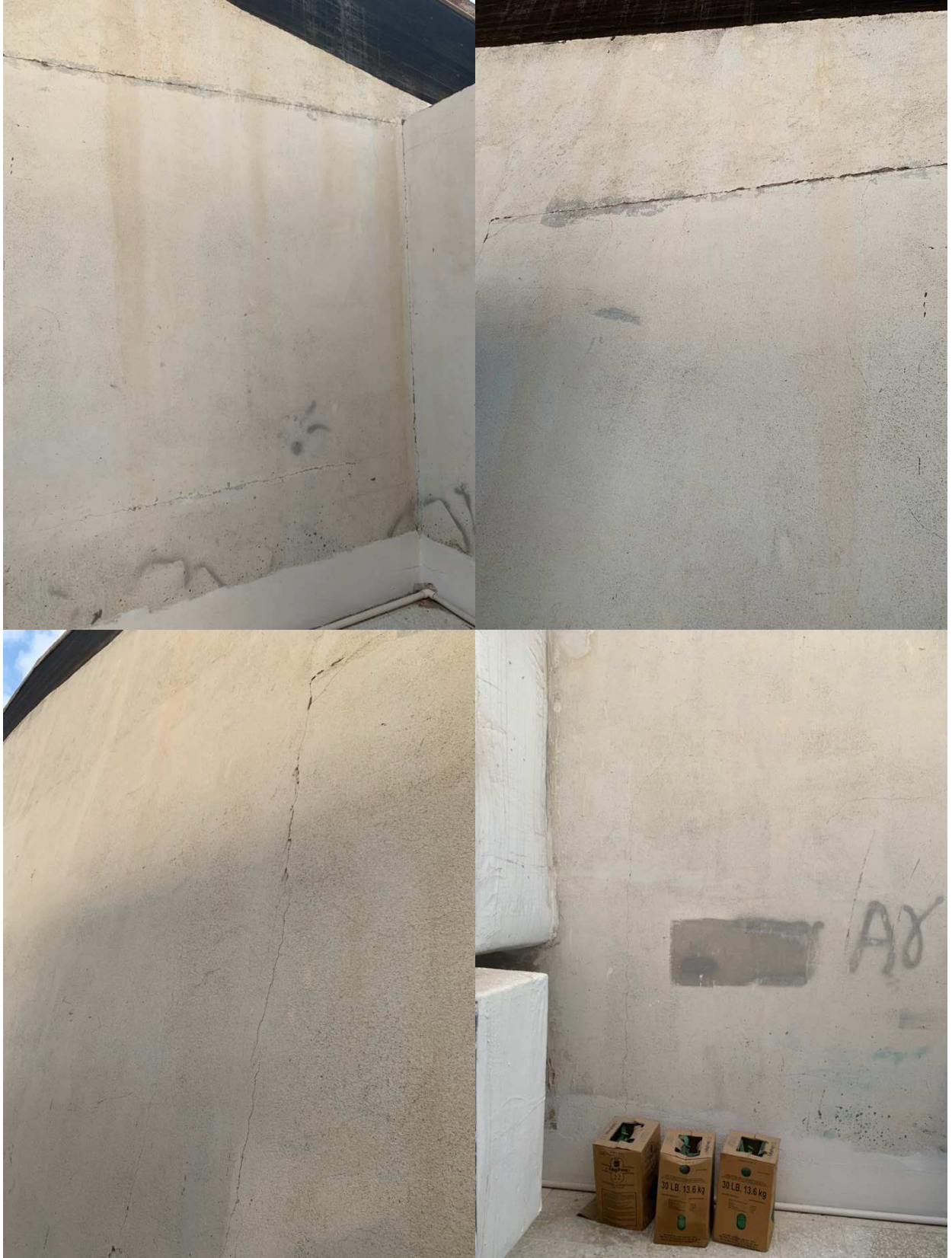


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Obs. No.

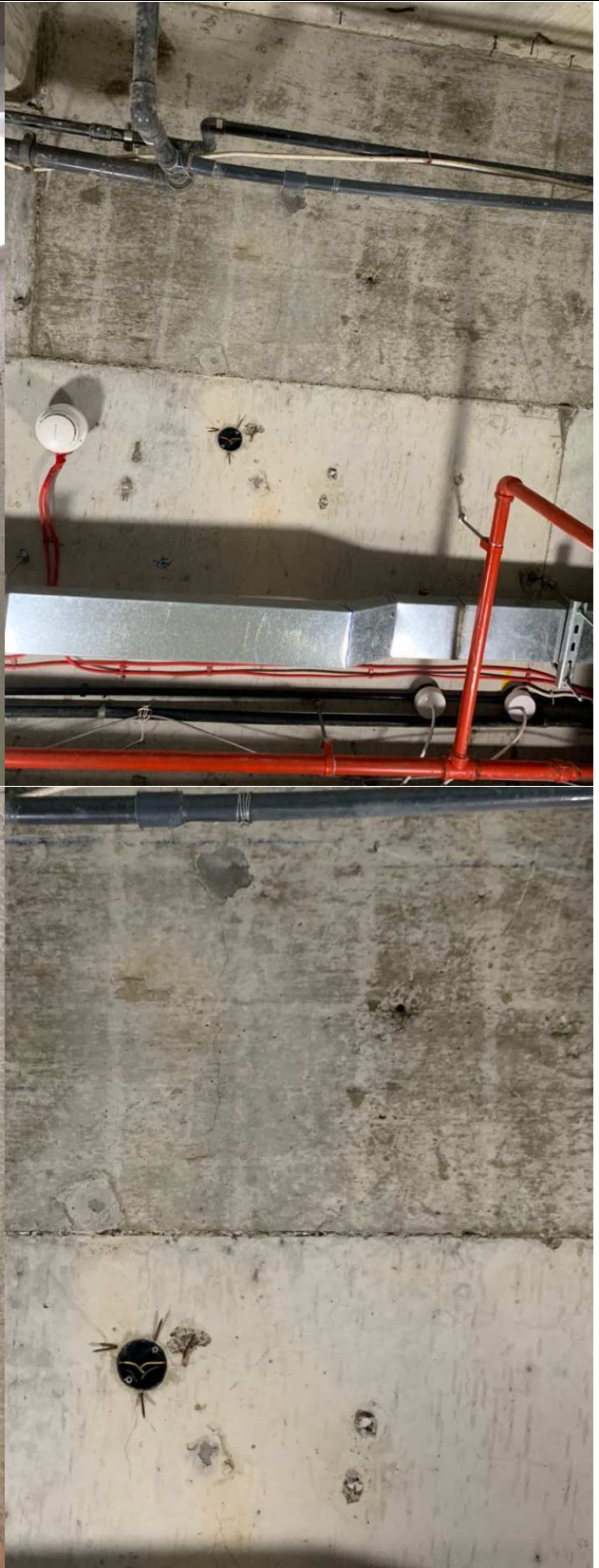
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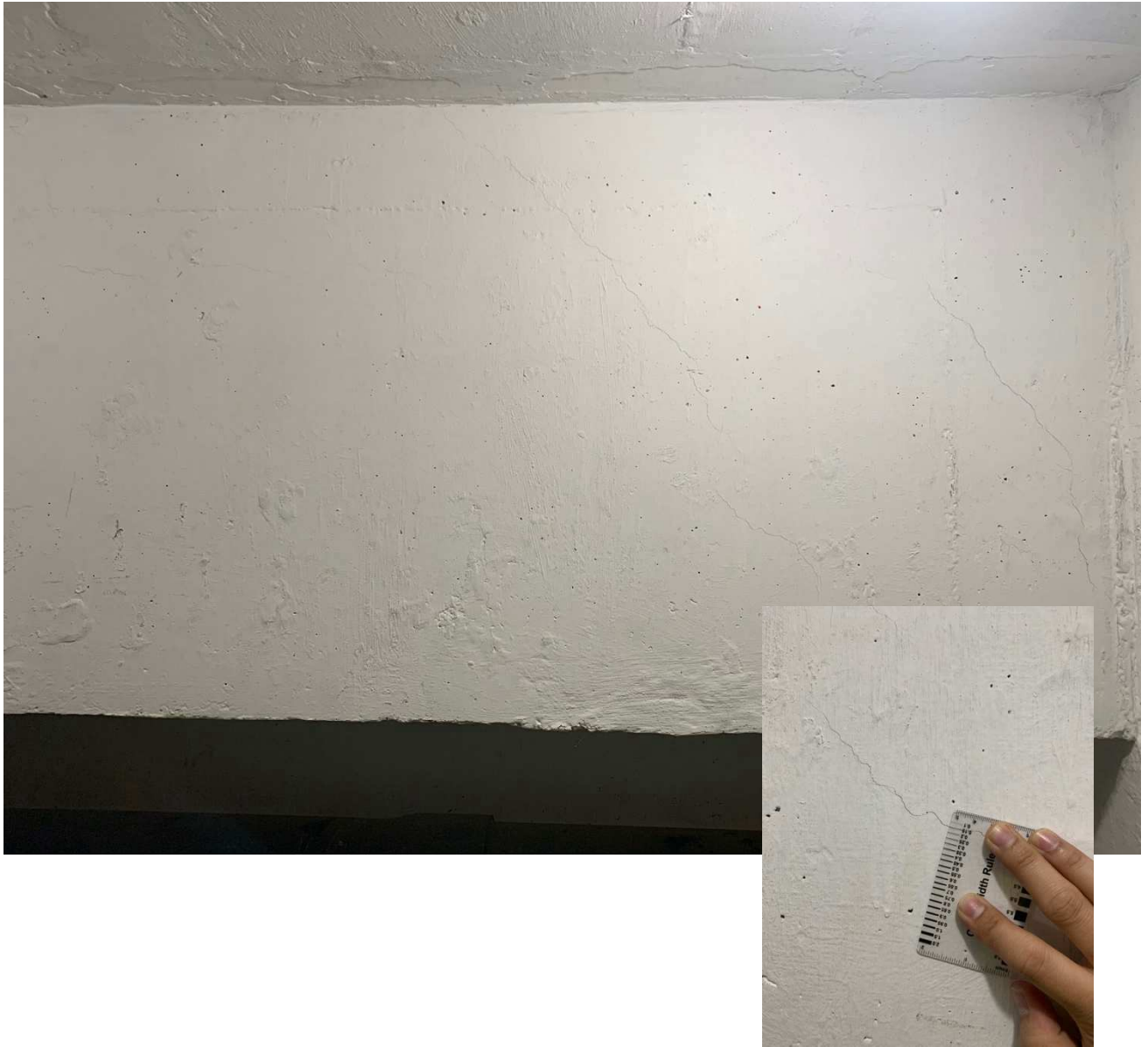




Obs. No.

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Obs. No.

26









Obs. No.

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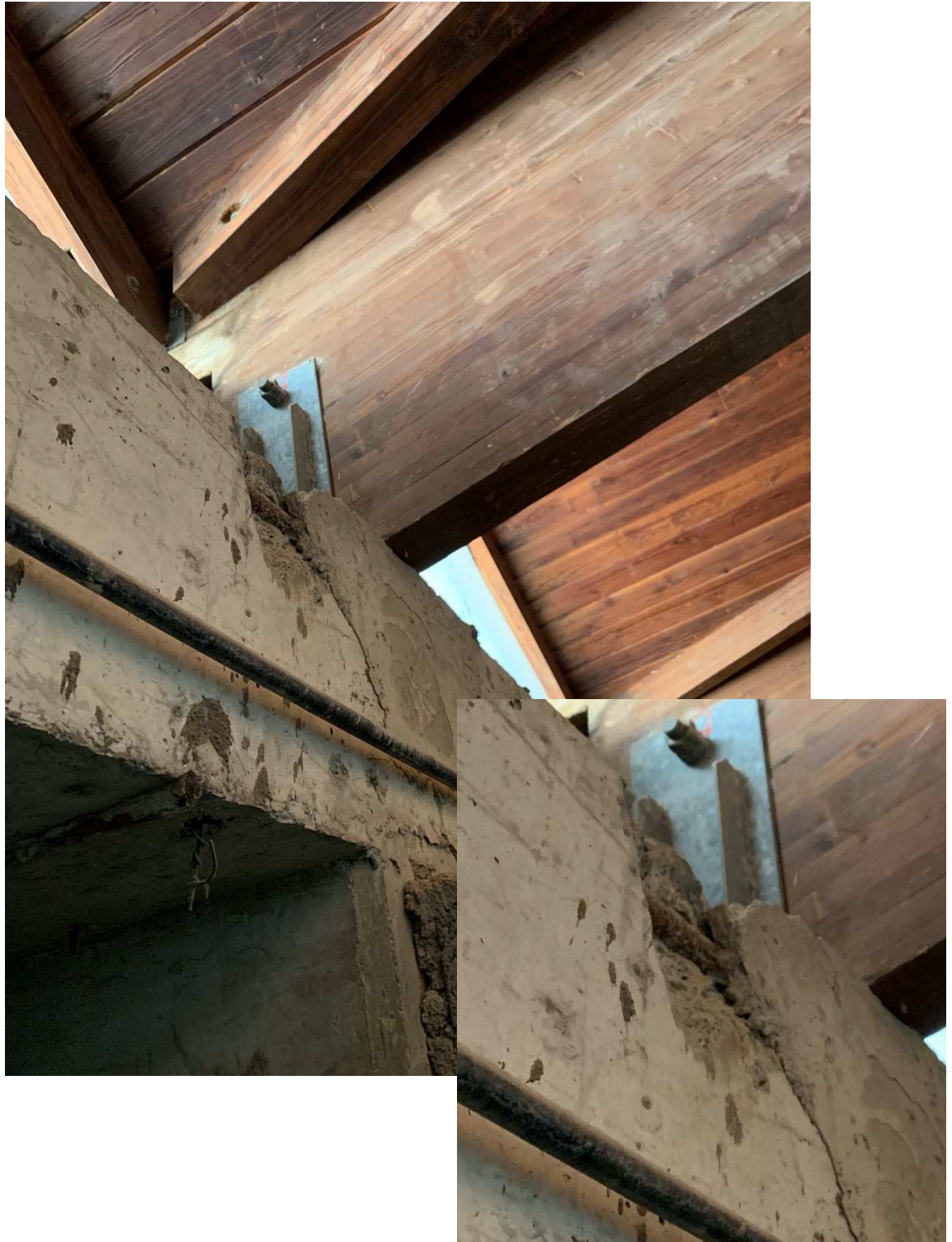
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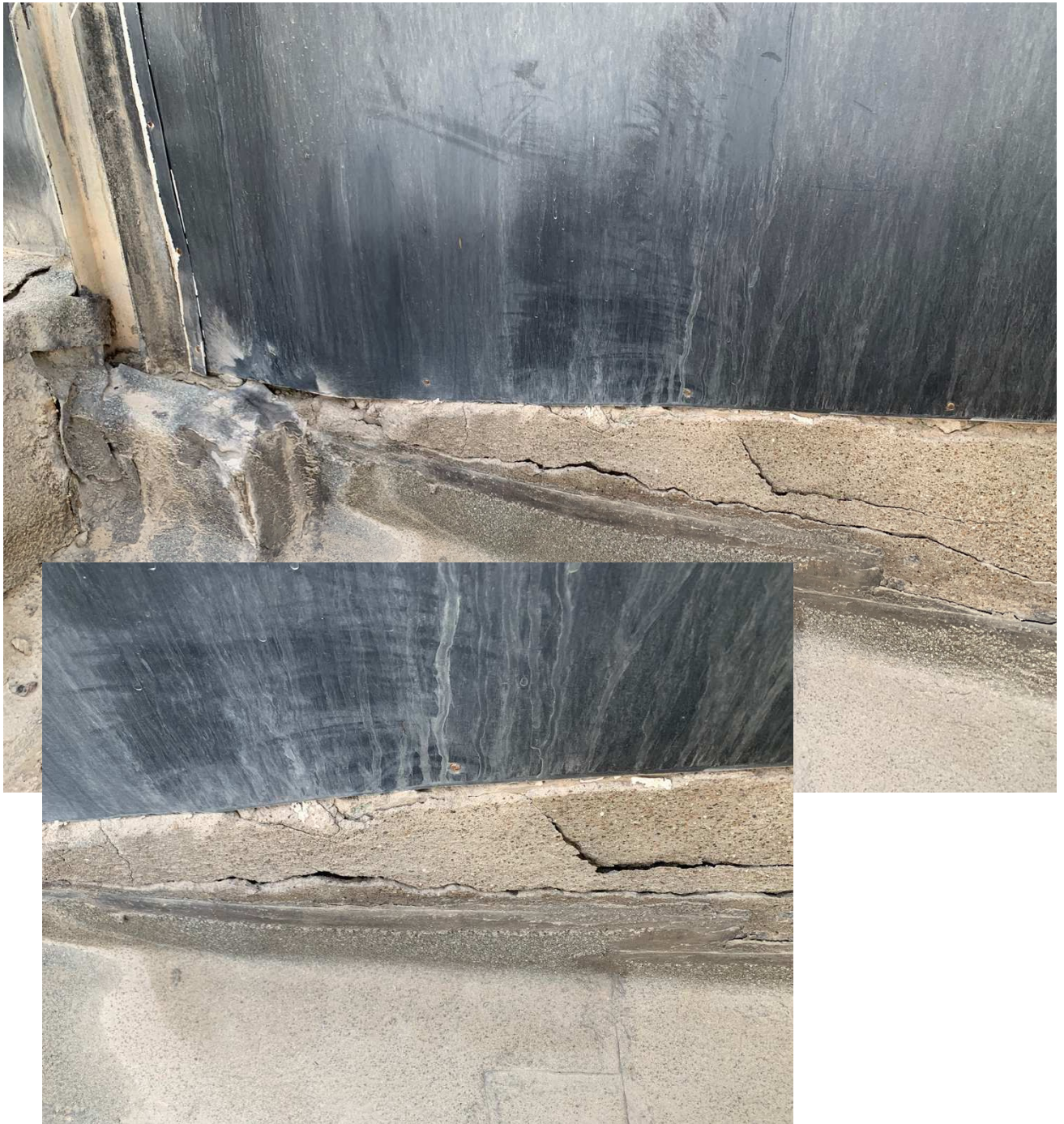
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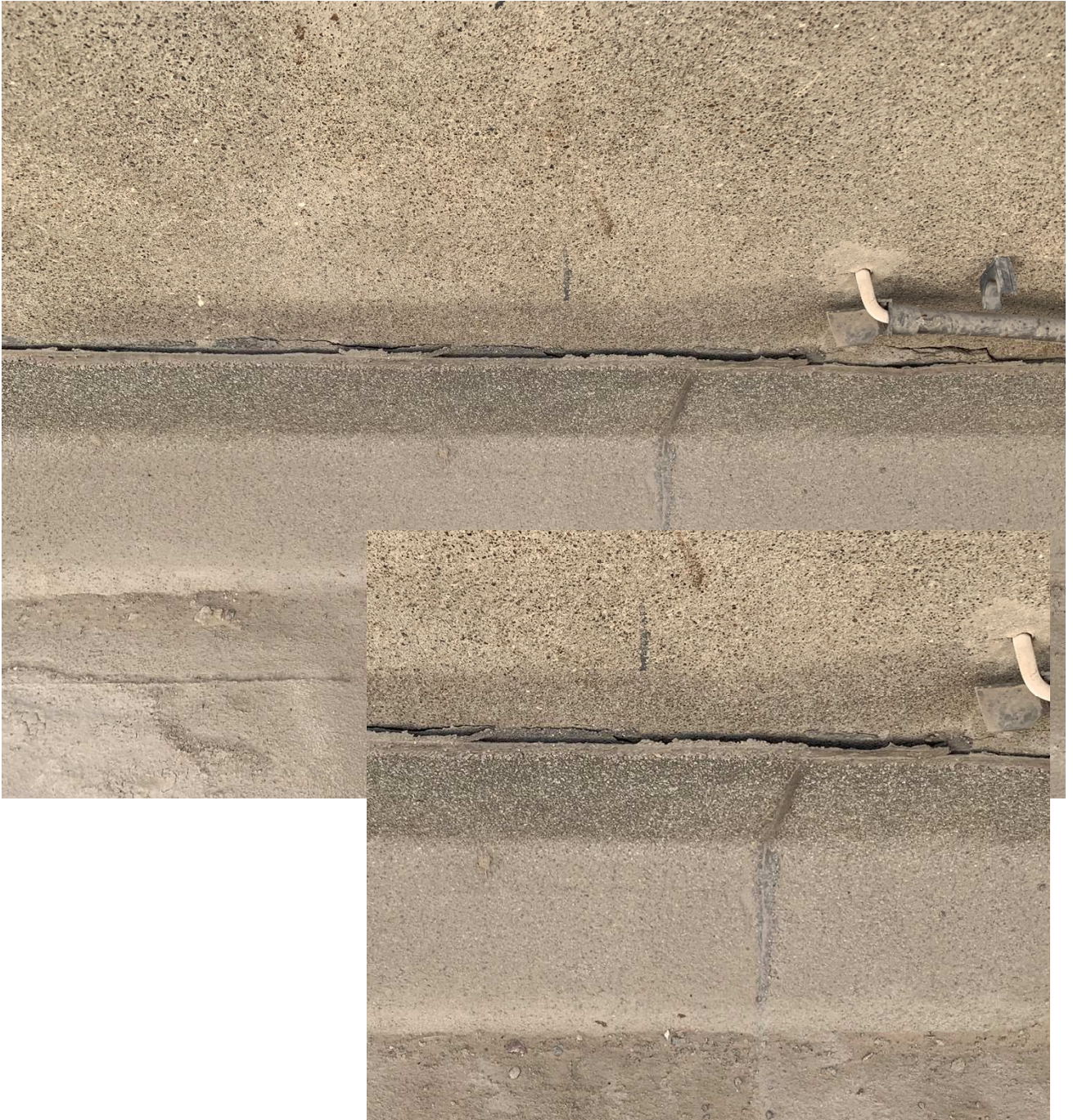
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Obs. No.

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Obs. No.

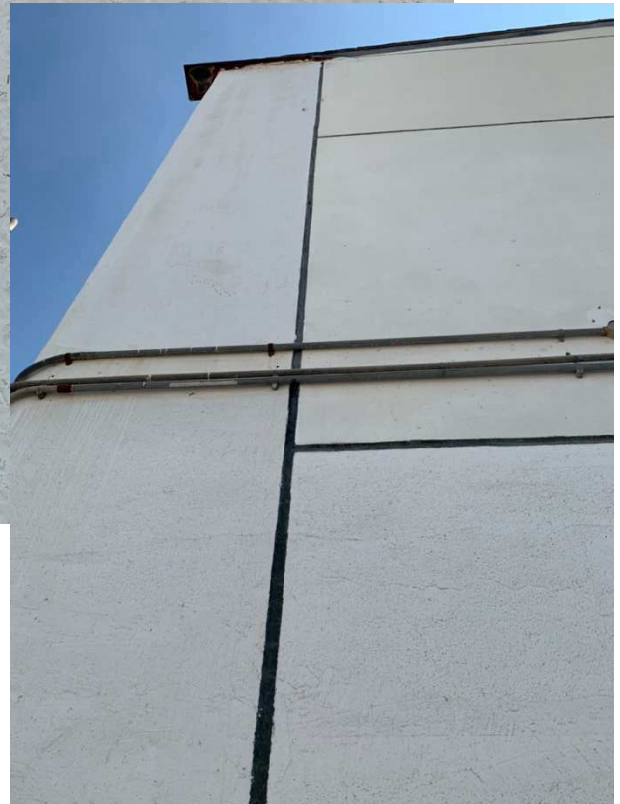
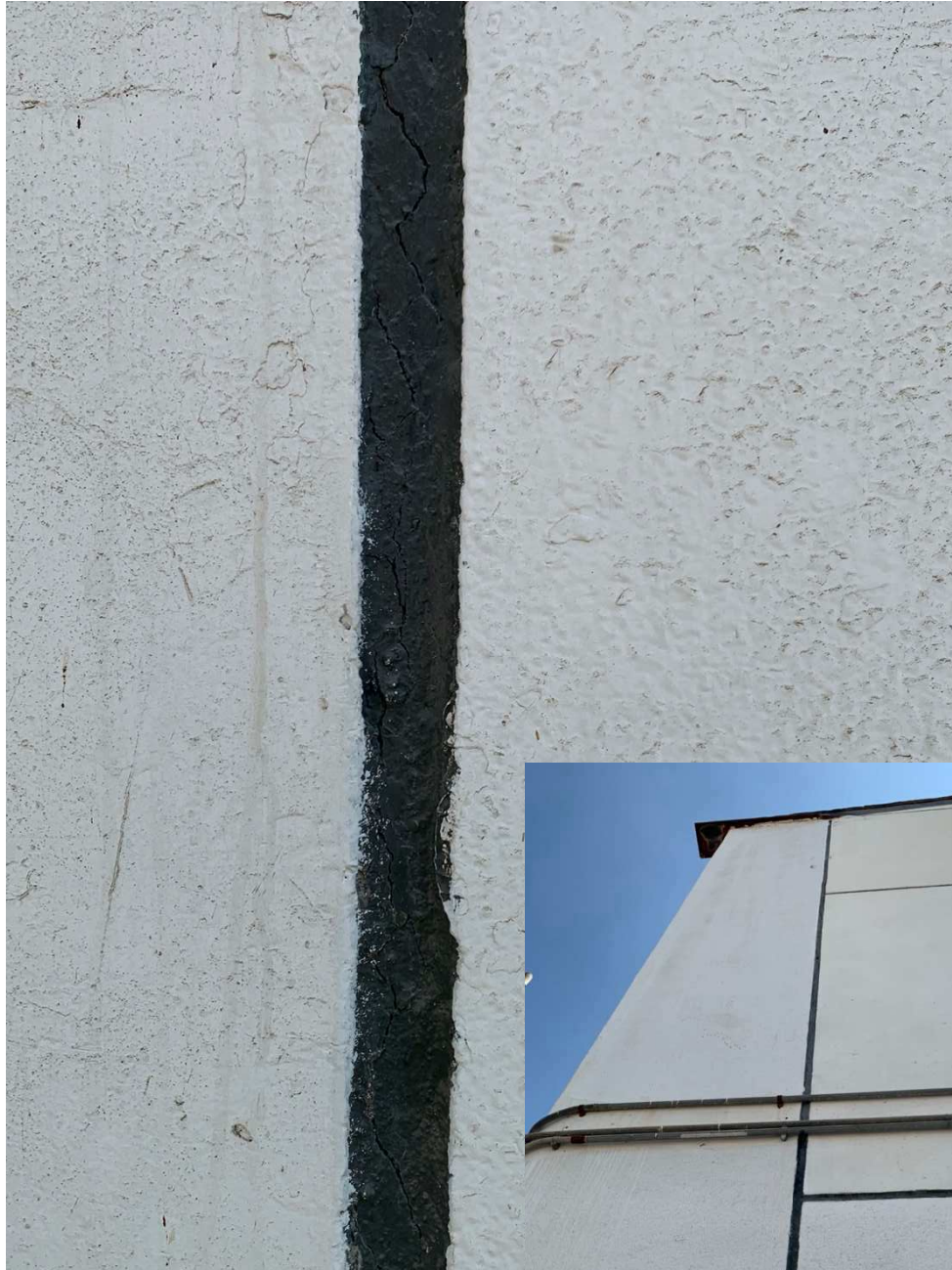
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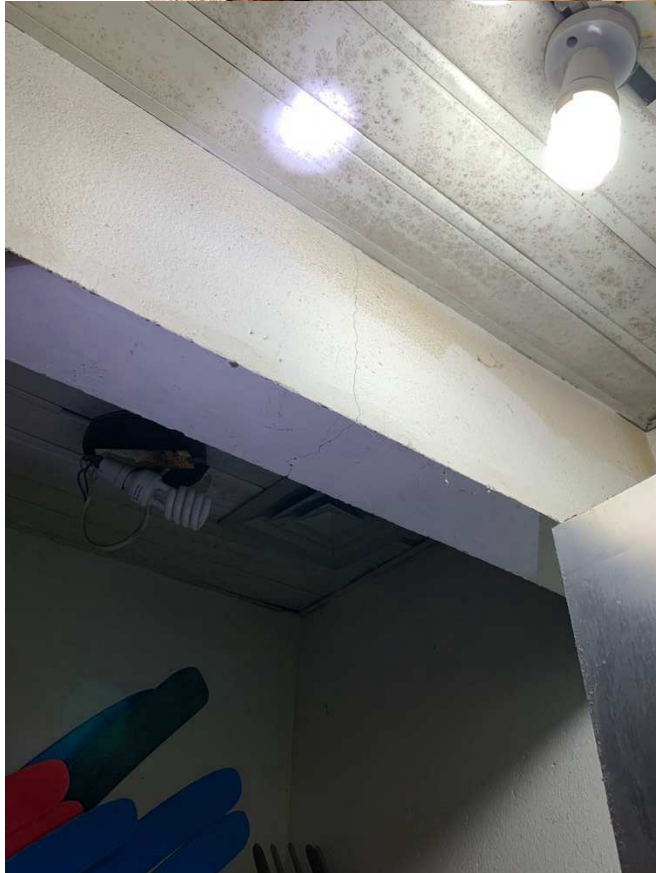






Obs. No.

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Obs. No.

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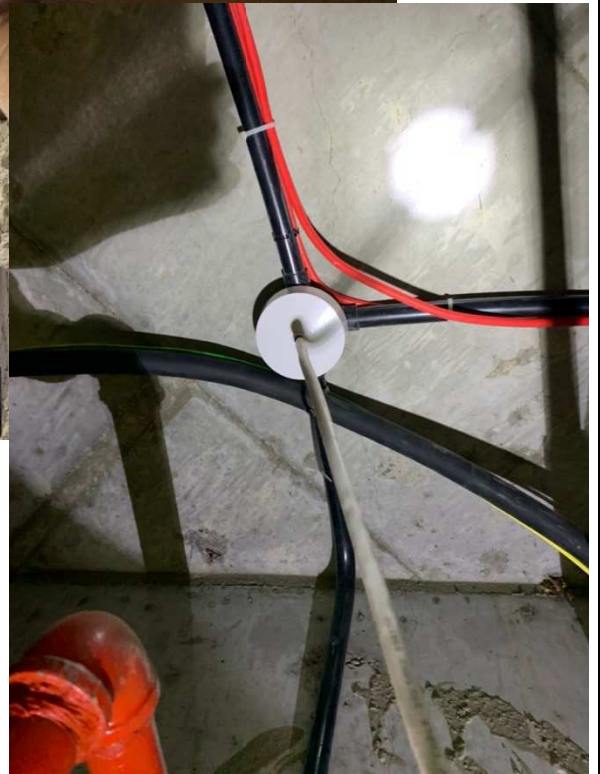
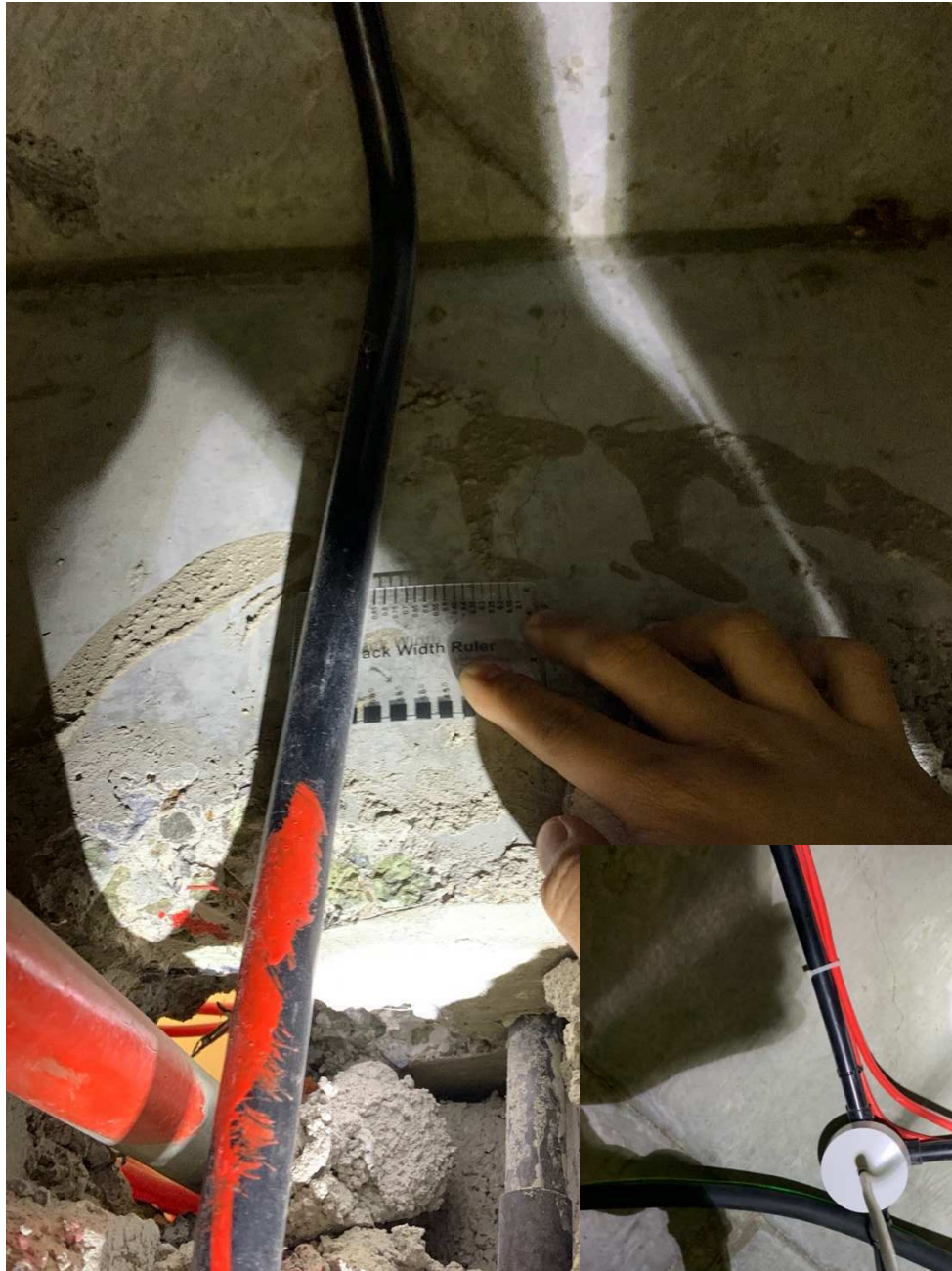
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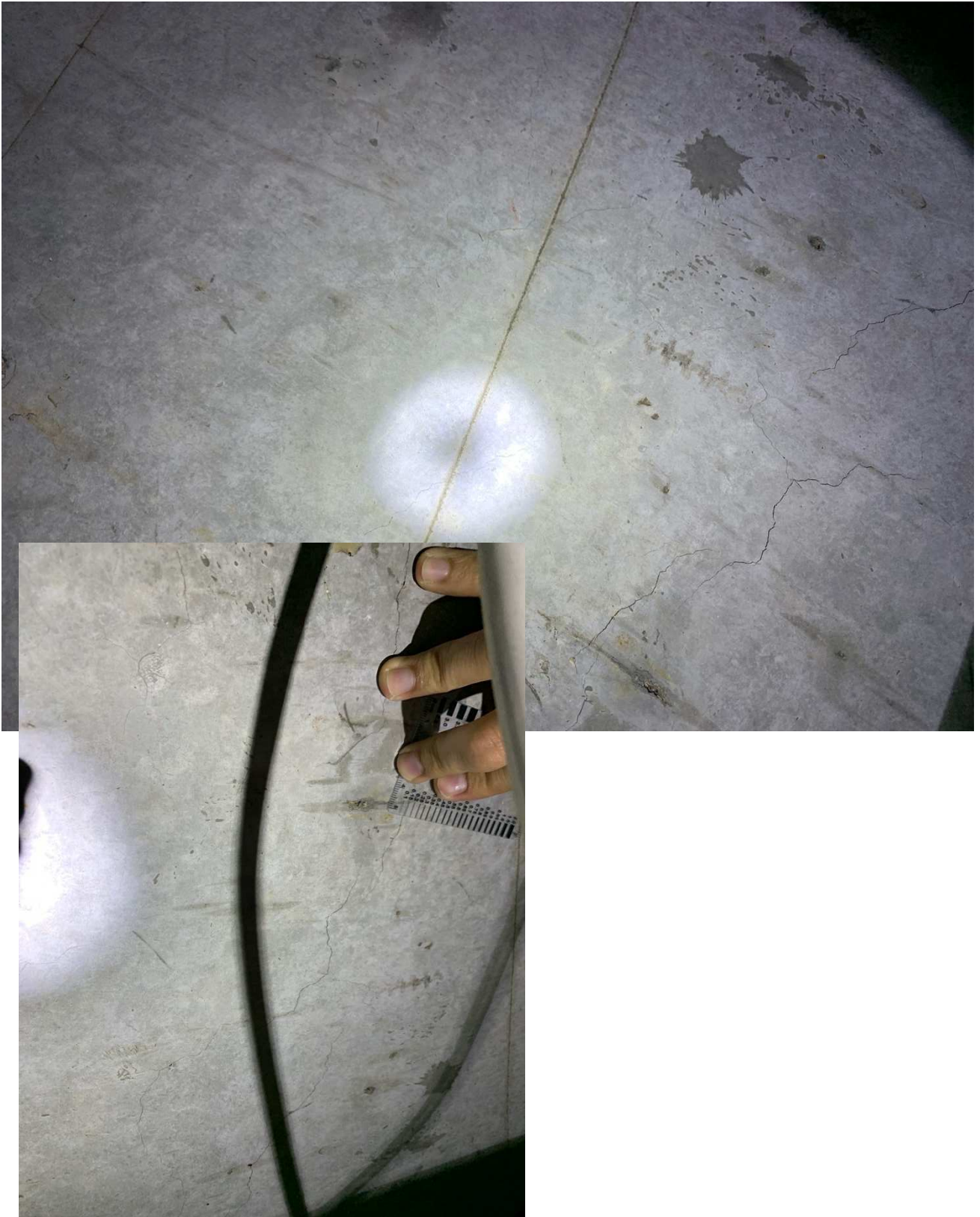
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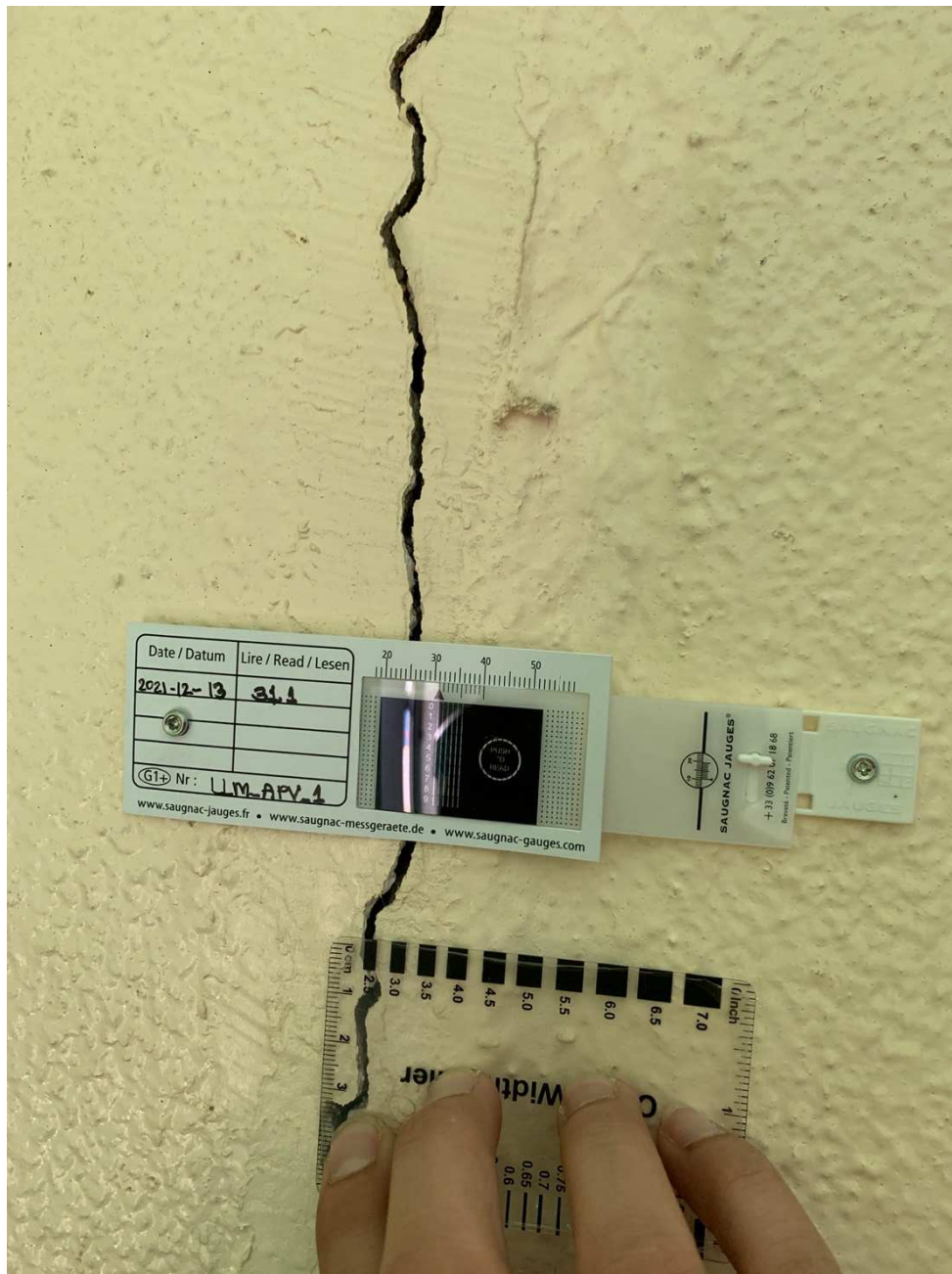


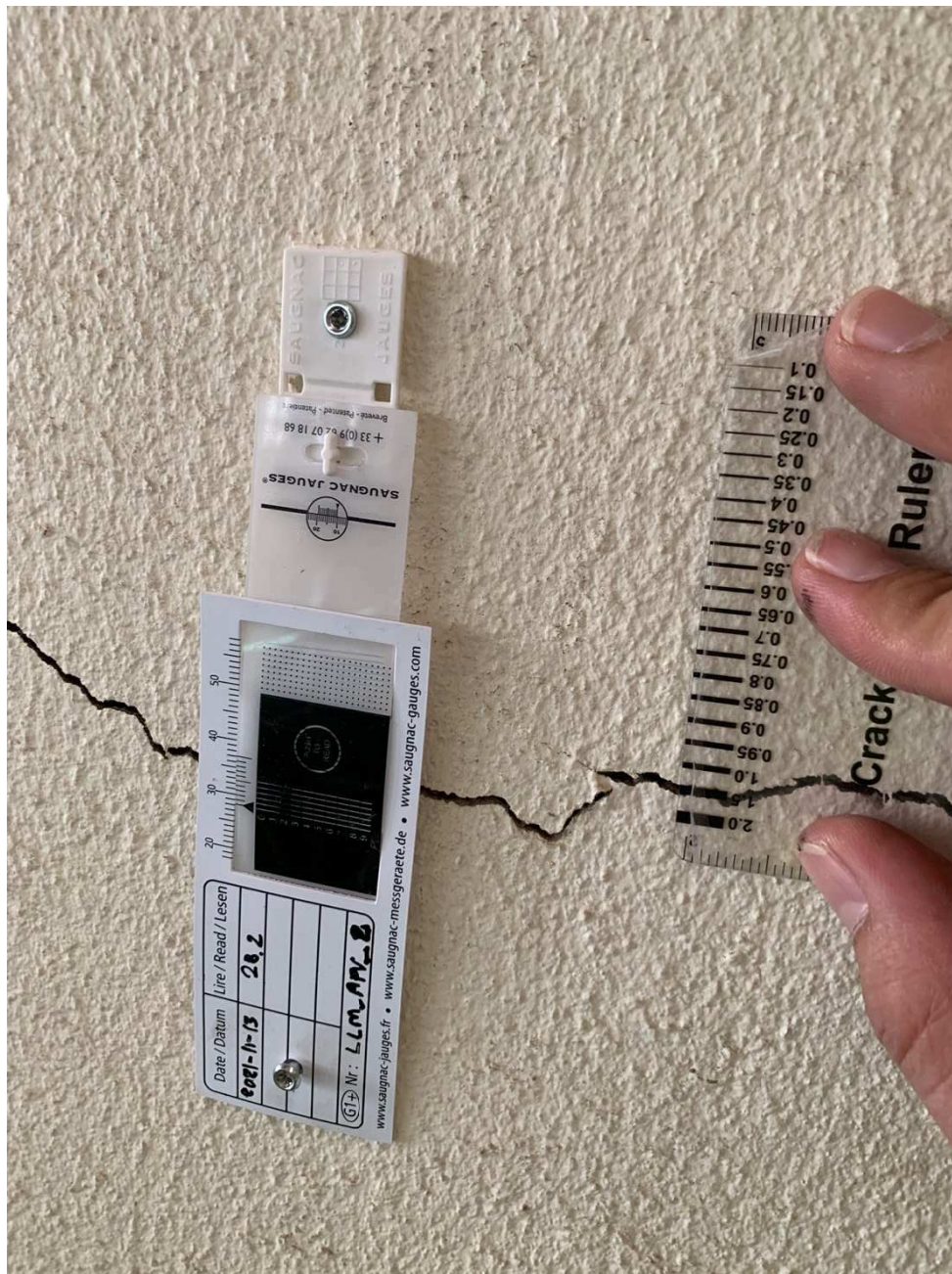
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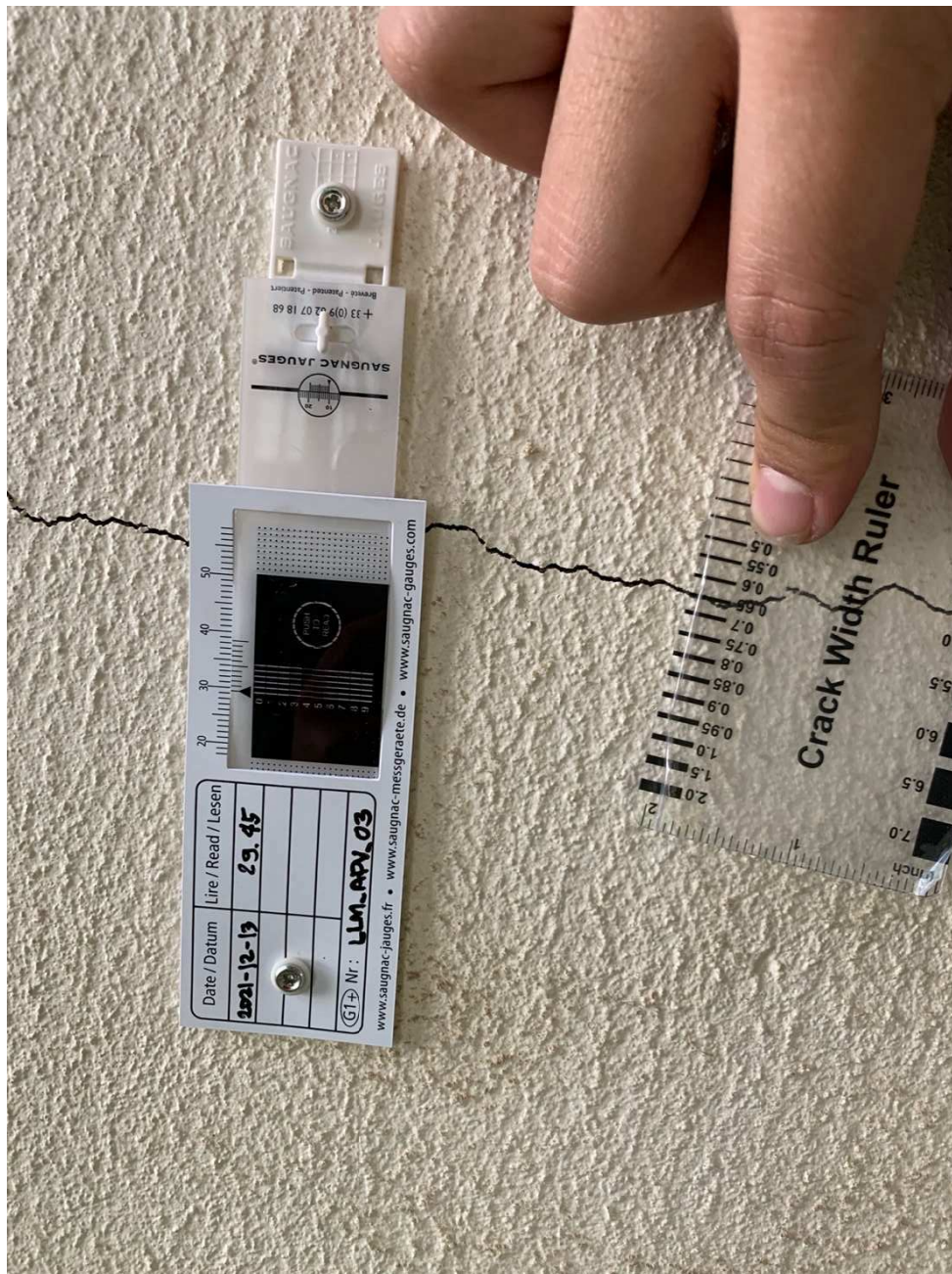
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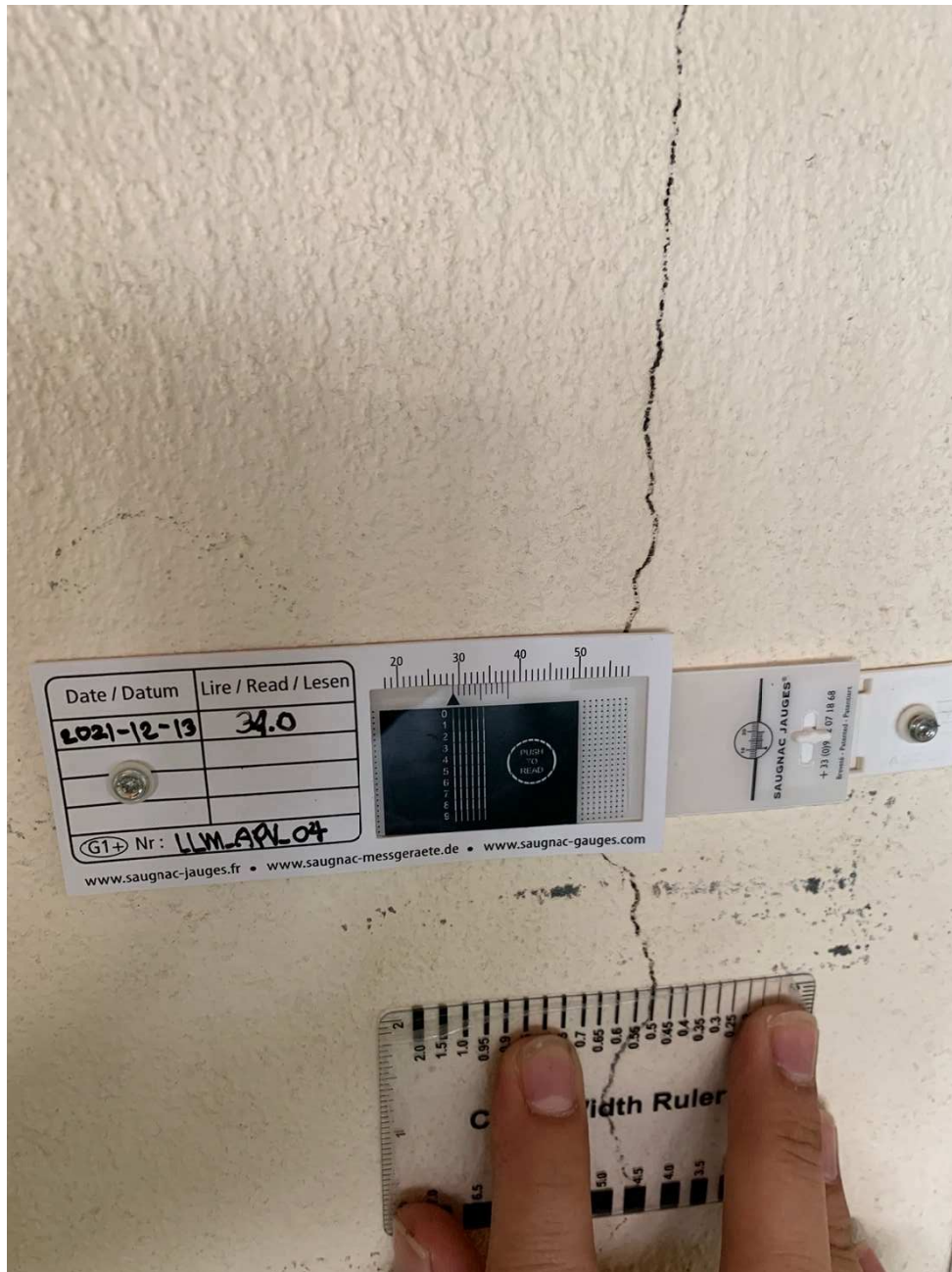


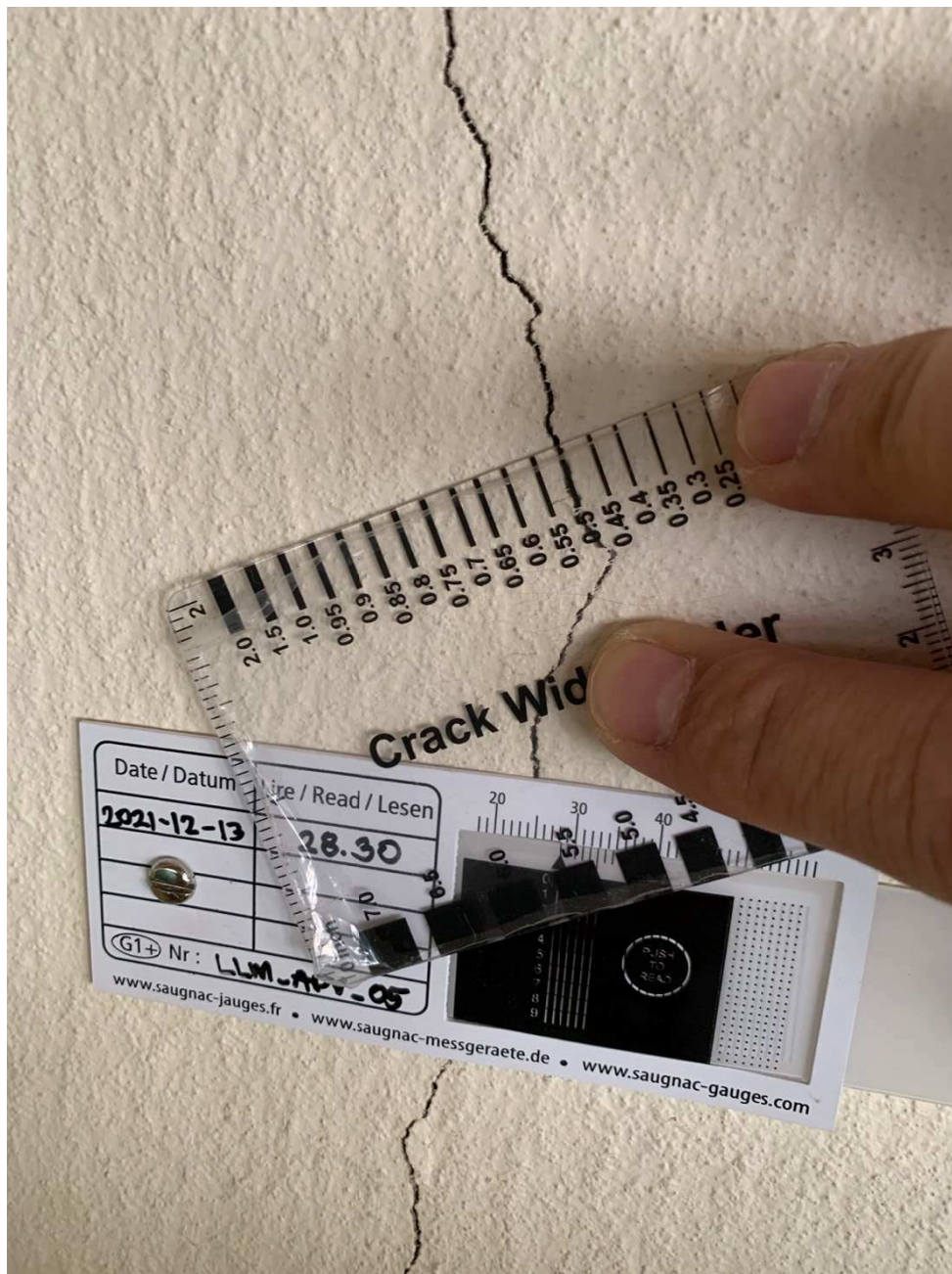
APPENDIX B – CRACK MONITORING







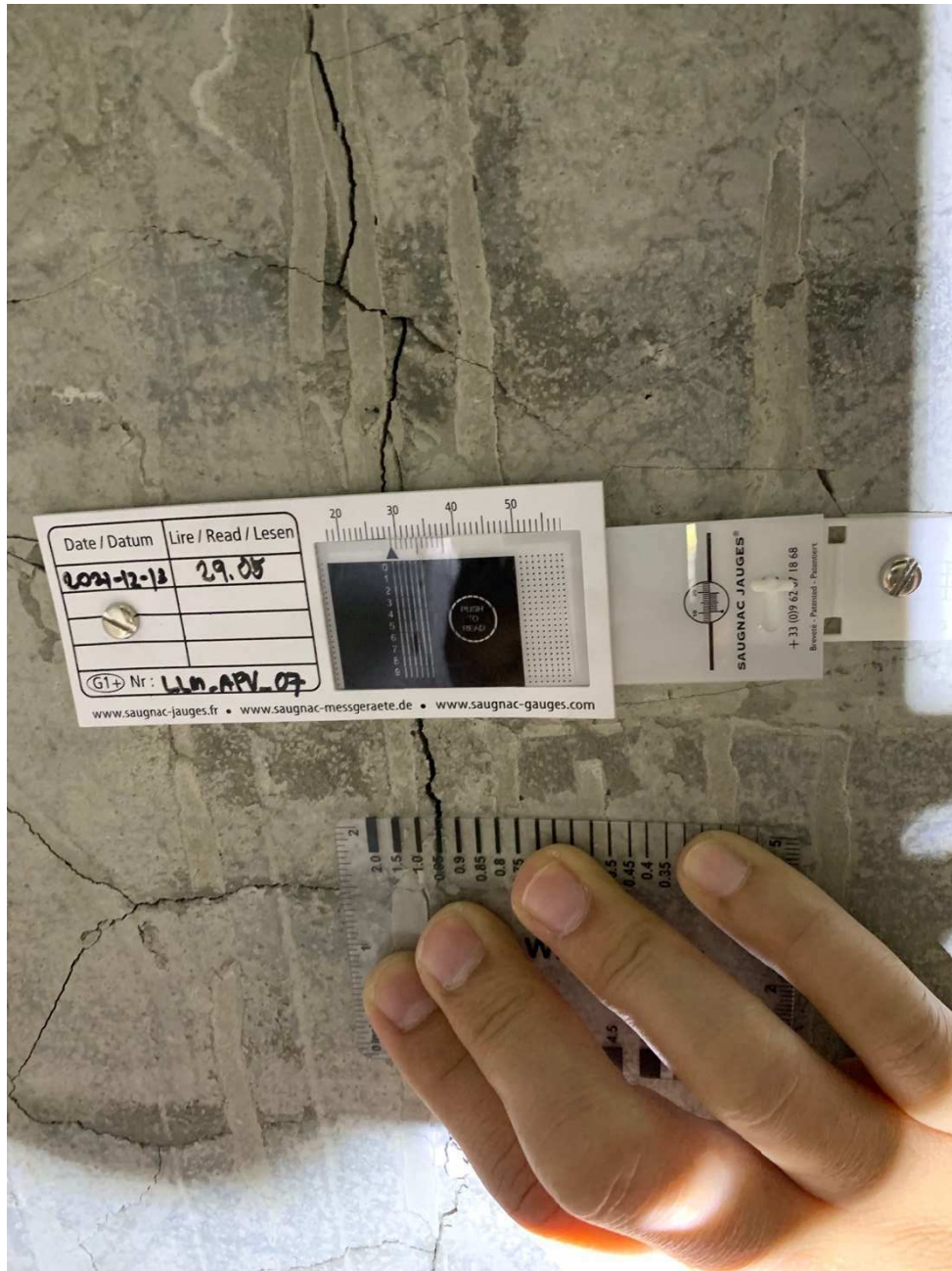


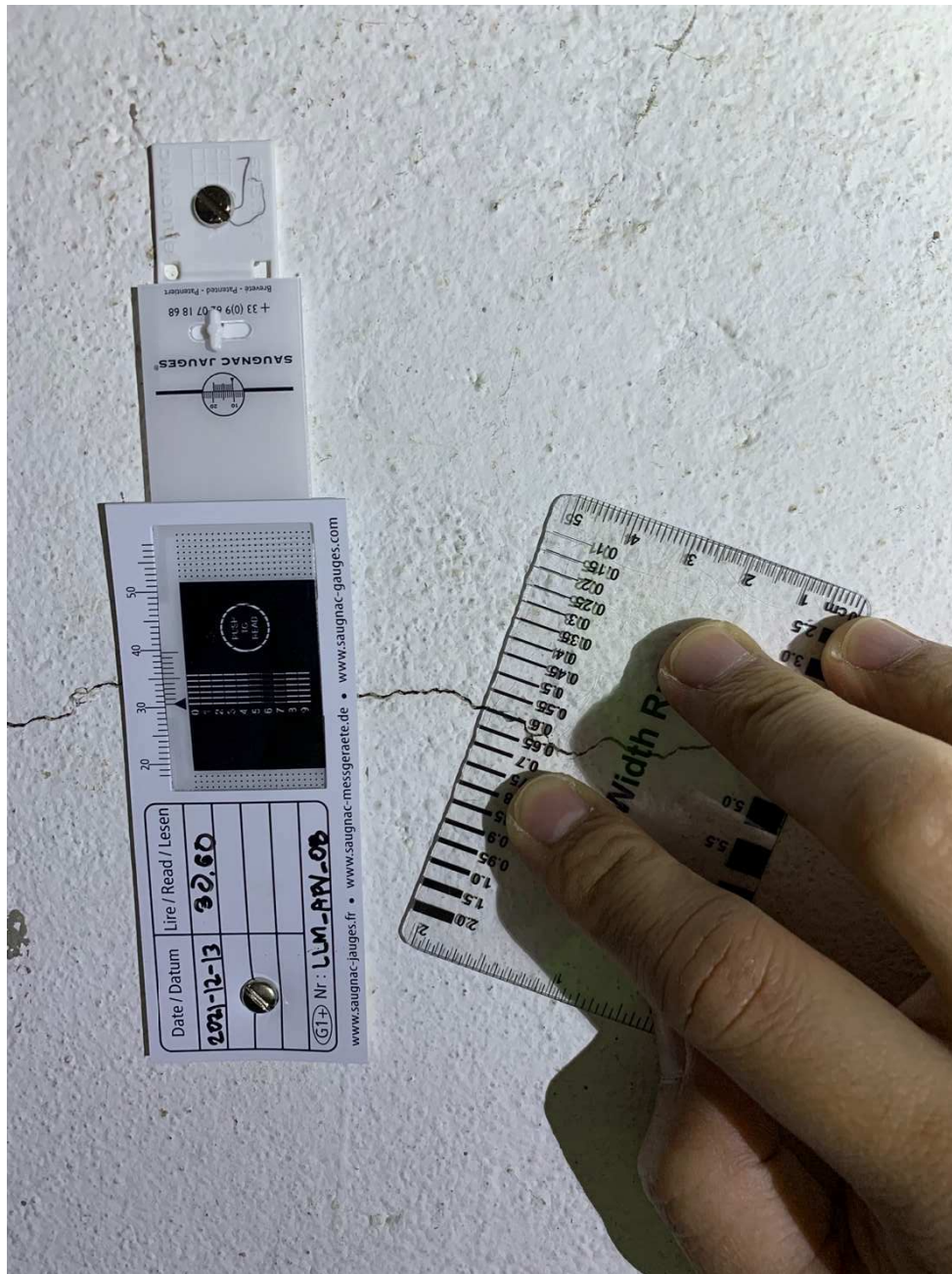


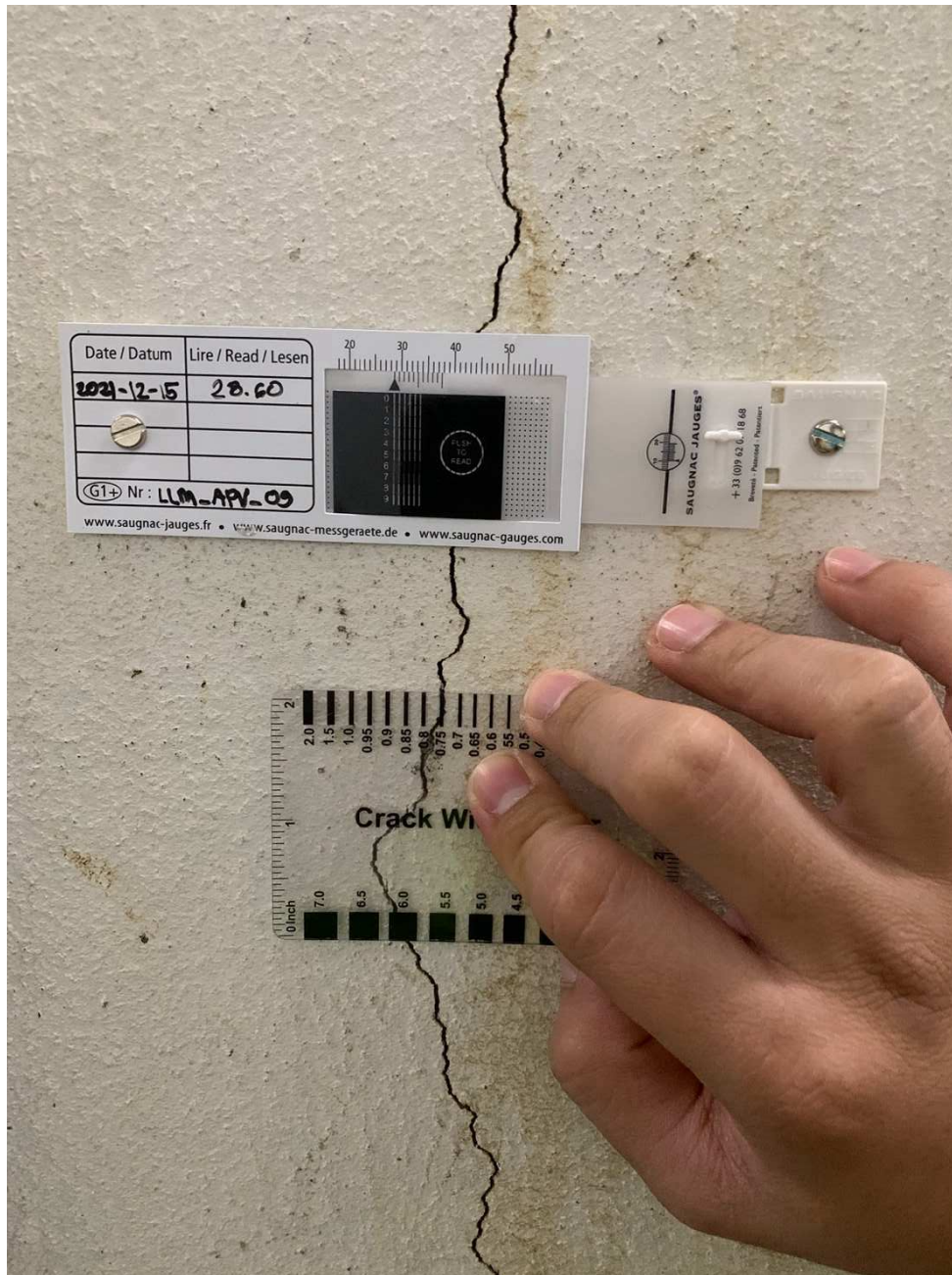
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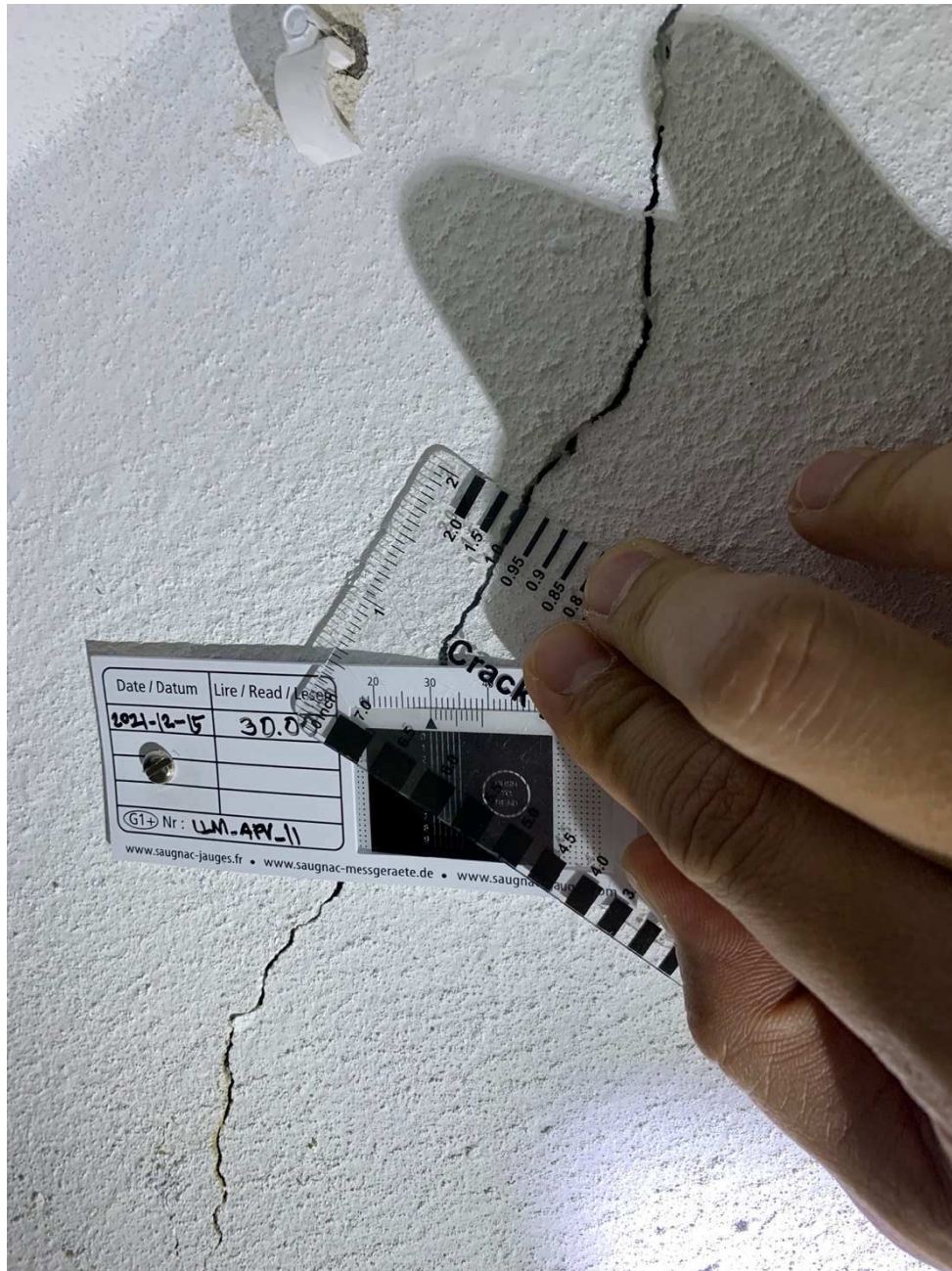


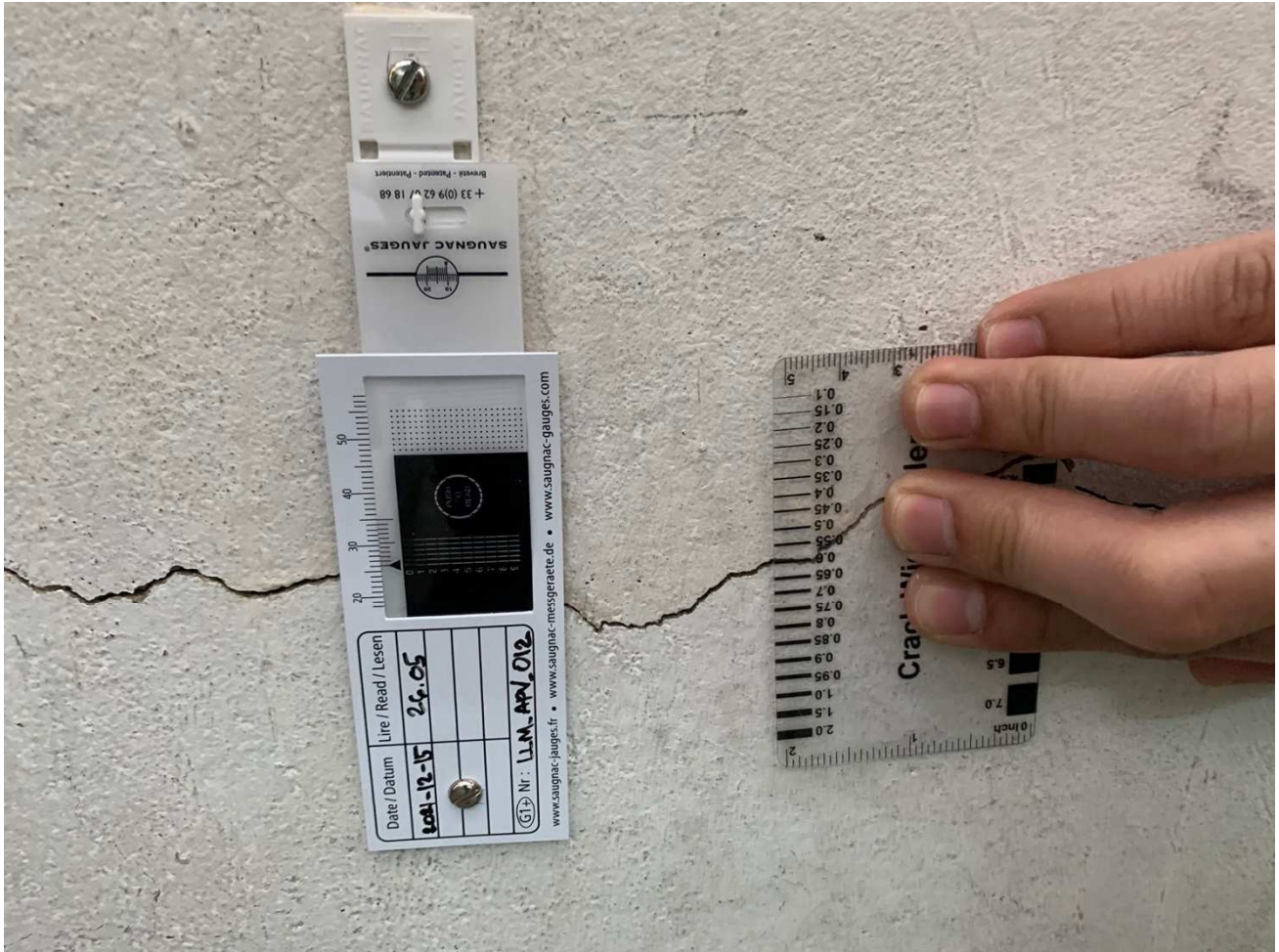


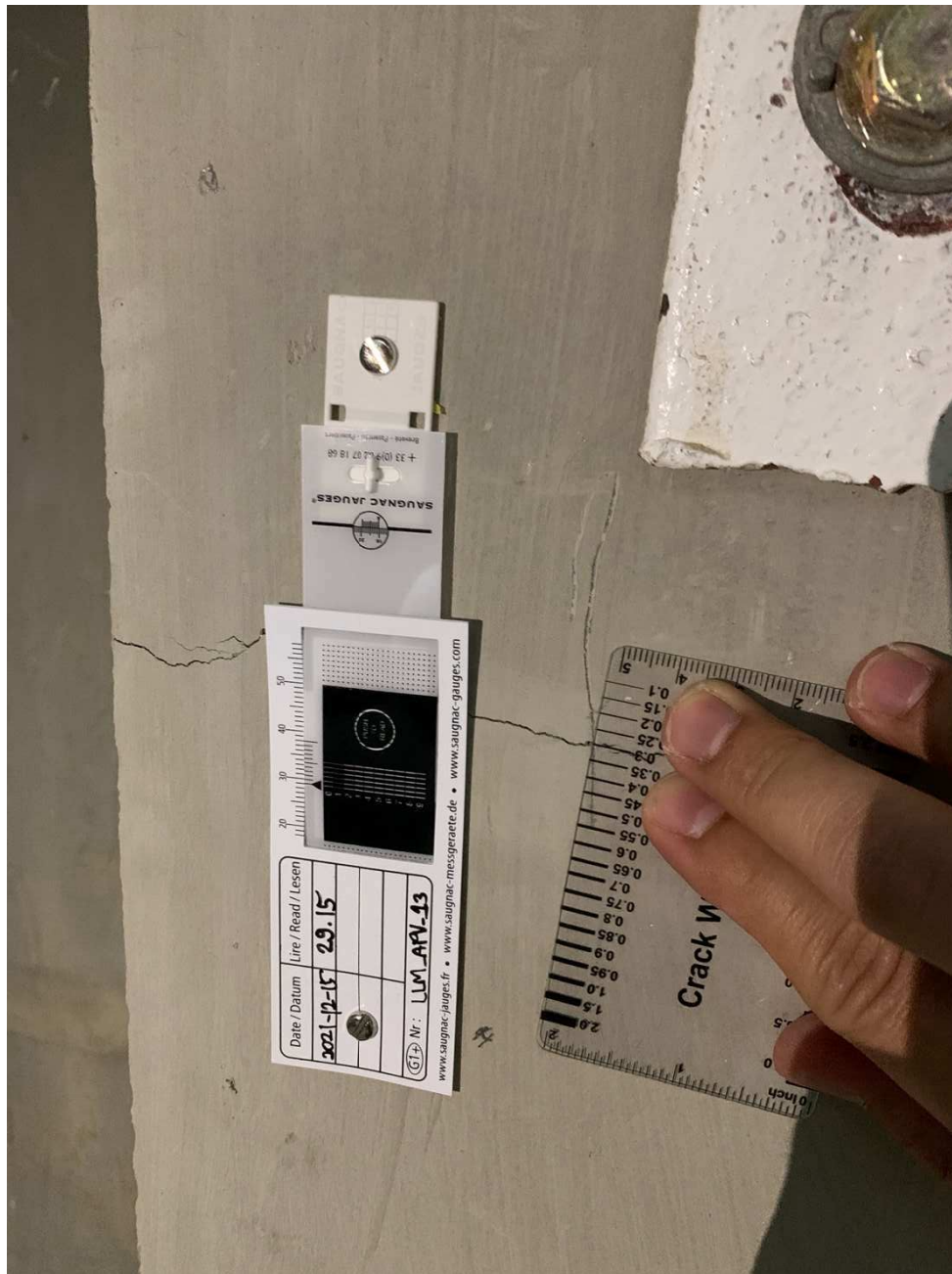




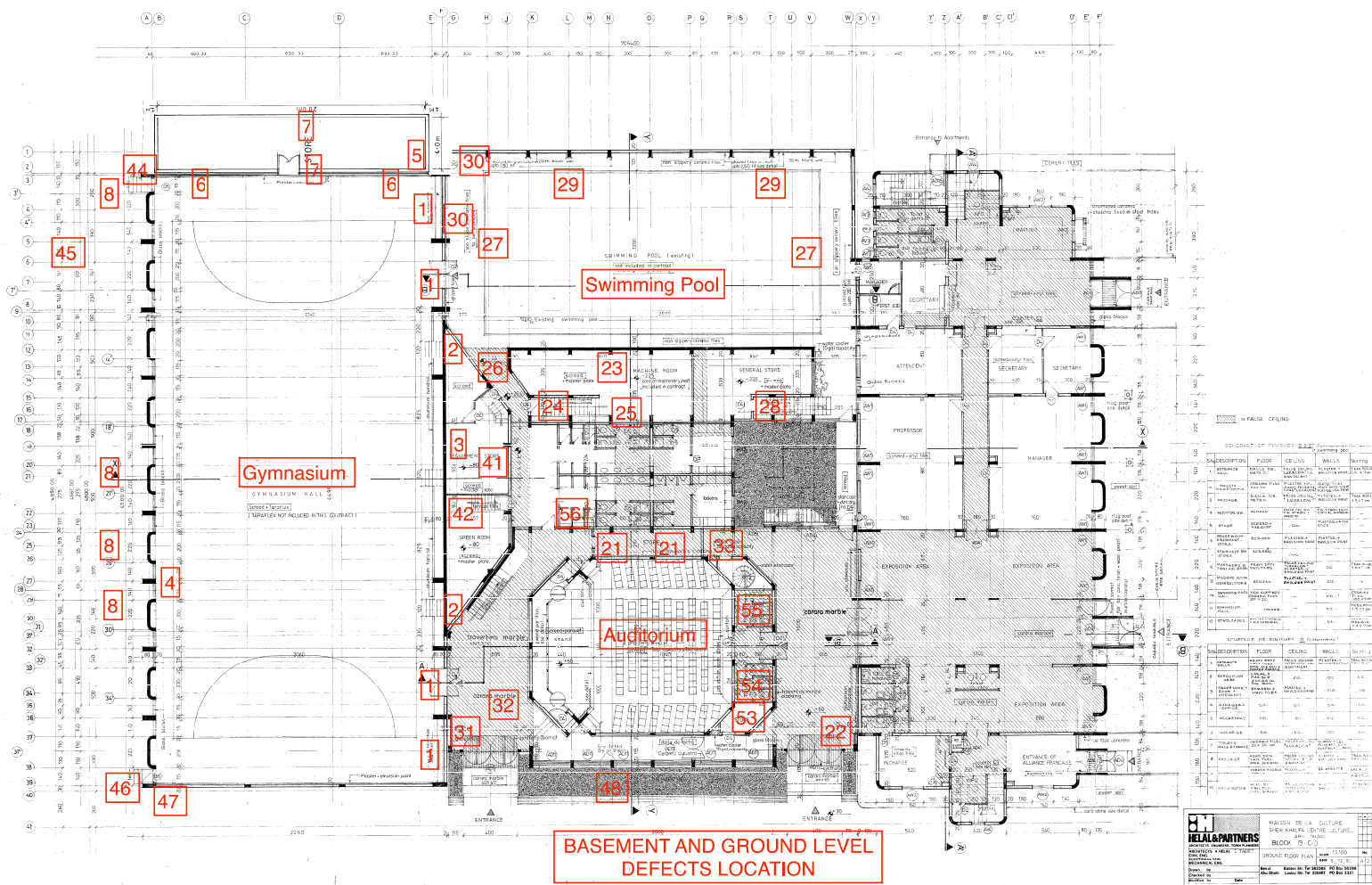




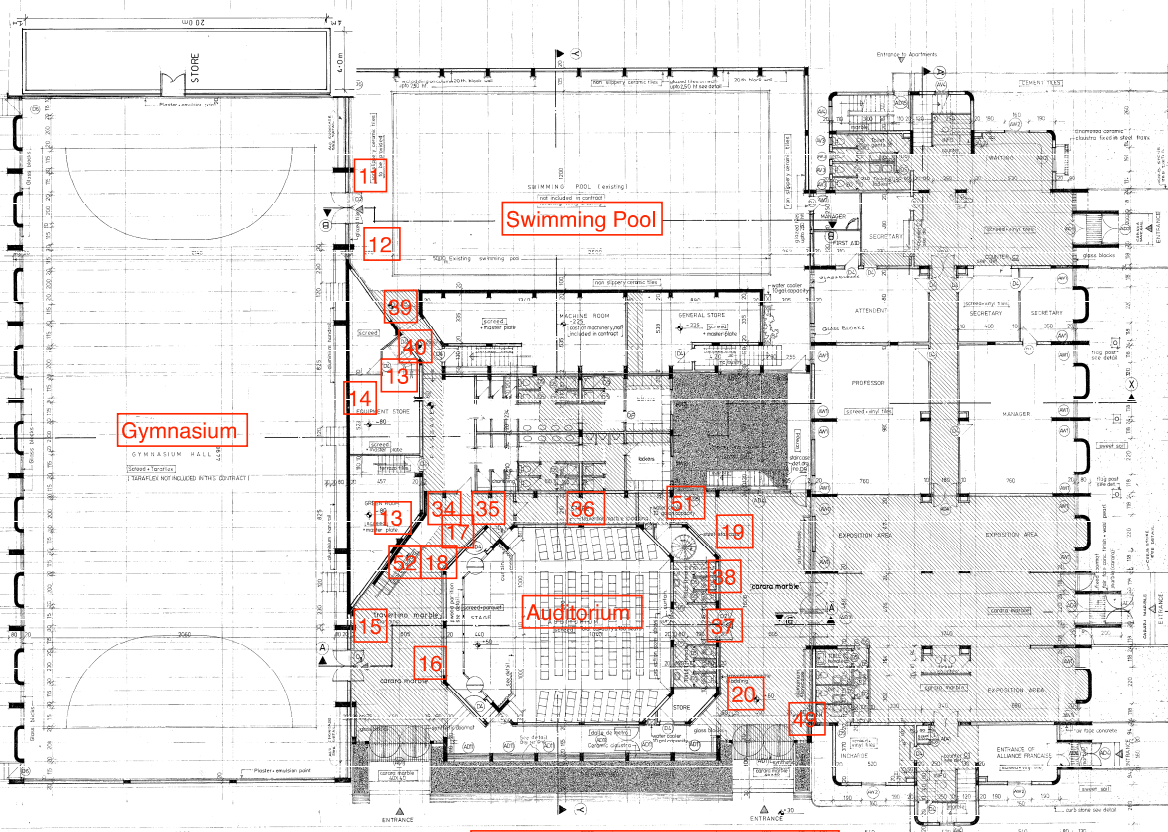




APPENDIX C – DEFECTS LOCATION



A B C D E F G H J K L M N O P Q R S T U V W X Y Z A B C D E F



FIRST FLOOR AND ROOF LEVEL
DEFECTS LOCATION

SCHEDULE OF FINISHED WORK									
DESCRIPTION	FLOOR	CEILING	WALLS	SKYLINE	DOORS	WINDOWS	STAIRS	ELEVATORS	OTHER
1. GENERAL FINISHES	100	100	100	100	100	100	100	100	100
2. PAINTS	100	100	100	100	100	100	100	100	100
3. CARPETING	100	100	100	100	100	100	100	100	100
4. TILES	100	100	100	100	100	100	100	100	100
5. STAIRS	100	100	100	100	100	100	100	100	100
6. ELEVATORS	100	100	100	100	100	100	100	100	100
7. EXHIBITION AREA	100	100	100	100	100	100	100	100	100
8. AUDITORIUM	100	100	100	100	100	100	100	100	100
9. GYMNASIUM	100	100	100	100	100	100	100	100	100
10. SWIMMING POOL	100	100	100	100	100	100	100	100	100
11. GENERAL STORE	100	100	100	100	100	100	100	100	100
12. MACHINE ROOM	100	100	100	100	100	100	100	100	100
13. ATTENDANT	100	100	100	100	100	100	100	100	100
14. SECRETARY	100	100	100	100	100	100	100	100	100
15. PROFESSOR	100	100	100	100	100	100	100	100	100
16. MAINTENANCE	100	100	100	100	100	100	100	100	100
17. ENTRANCE	100	100	100	100	100	100	100	100	100
18. EXHIBITION AREA	100	100	100	100	100	100	100	100	100
19. AUDITORIUM	100	100	100	100	100	100	100	100	100
20. GYMNASIUM	100	100	100	100	100	100	100	100	100
21. SWIMMING POOL	100	100	100	100	100	100	100	100	100
22. GENERAL STORE	100	100	100	100	100	100	100	100	100
23. MACHINE ROOM	100	100	100	100	100	100	100	100	100
24. ATTENDANT	100	100	100	100	100	100	100	100	100
25. SECRETARY	100	100	100	100	100	100	100	100	100
26. PROFESSOR	100	100	100	100	100	100	100	100	100
27. MAINTENANCE	100	100	100	100	100	100	100	100	100
28. ENTRANCE	100	100	100	100	100	100	100	100	100
29. EXHIBITION AREA	100	100	100	100	100	100	100	100	100
30. AUDITORIUM	100	100	100	100	100	100	100	100	100
31. GYMNASIUM	100	100	100	100	100	100	100	100	100
32. SWIMMING POOL	100	100	100	100	100	100	100	100	100
33. GENERAL STORE	100	100	100	100	100	100	100	100	100
34. MACHINE ROOM	100	100	100	100	100	100	100	100	100
35. ATTENDANT	100	100	100	100	100	100	100	100	100
36. SECRETARY	100	100	100	100	100	100	100	100	100
37. PROFESSOR	100	100	100	100	100	100	100	100	100
38. MAINTENANCE	100	100	100	100	100	100	100	100	100
39. ENTRANCE	100	100	100	100	100	100	100	100	100
40. EXHIBITION AREA	100	100	100	100	100	100	100	100	100
41. AUDITORIUM	100	100	100	100	100	100	100	100	100
42. GYMNASIUM	100	100	100	100	100	100	100	100	100
43. SWIMMING POOL	100	100	100	100	100	100	100	100	100

MAISON DE LA CULTURE
PAR MAISON CENTRE CULTUREL
BLOCC 5 C.C.

PROJET: MAISON DE LA CULTURE
ARCHITECTE: H. ELAL & PARTNERS
DATE: 1980

PROJET: MAISON DE LA CULTURE
ARCHITECTE: H. ELAL & PARTNERS
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ARCHITECTE: H. ELAL & PARTNERS
DATE: 1980

APPENDIX D – INSTALLED CRACK GAUGE LOCATION

A B C D E F G H J K L M N O P Q R S T U V W X Y Z A B C D E F

LLM_APV_01
(Gymnasium Wall)

LLM_APV_02
(Gymnasium Wall)

LLM_APV_03
(Gymnasium Wall)

LLM_APV_04
(Gymnasium Wall)

LLM_APV_12
(Pump Room Wall)

LLM_APV_06
(Bleacher Underside)

LLM_APV_09
(Auditorium Store Wall)

LLM_APV_07
(Bleacher Underside)

LLM_APV_08
(Basement Wall)

LLM_APV_11
(Roof Level)

LLM_APV_05
(Gymnasium Wall)

LLM_APV_13
(Bleacher Underside -
Column)

LLM_APV_10
(Men's Changing Room)

INSTALLED CRACK GAUGE
LOCATIONS

SCHEDULE OF FINISHED FLOOR									
DESCRIPTION	FLOOR	CEILING	WALLS	SKYLIGHT	DOOR	STAIR	ROOF	UNDER FLOOR	UNDER ROOF
1. GYMNASIUM	100	100	100	100	100	100	100	100	100
2. AUDITORIUM	100	100	100	100	100	100	100	100	100
3. BASEMENT	100	100	100	100	100	100	100	100	100
4. ROOF	100	100	100	100	100	100	100	100	100
5. UNDER FLOOR	100	100	100	100	100	100	100	100	100
6. UNDER ROOF	100	100	100	100	100	100	100	100	100
7. ROOF	100	100	100	100	100	100	100	100	100
8. UNDER FLOOR	100	100	100	100	100	100	100	100	100
9. UNDER ROOF	100	100	100	100	100	100	100	100	100
10. ROOF	100	100	100	100	100	100	100	100	100
11. UNDER FLOOR	100	100	100	100	100	100	100	100	100
12. UNDER ROOF	100	100	100	100	100	100	100	100	100
13. ROOF	100	100	100	100	100	100	100	100	100
14. UNDER FLOOR	100	100	100	100	100	100	100	100	100
15. UNDER ROOF	100	100	100	100	100	100	100	100	100
16. ROOF	100	100	100	100	100	100	100	100	100
17. UNDER FLOOR	100	100	100	100	100	100	100	100	100
18. UNDER ROOF	100	100	100	100	100	100	100	100	100
19. ROOF	100	100	100	100	100	100	100	100	100
20. UNDER FLOOR	100	100	100	100	100	100	100	100	100
21. UNDER ROOF	100	100	100	100	100	100	100	100	100
22. ROOF	100	100	100	100	100	100	100	100	100
23. UNDER FLOOR	100	100	100	100	100	100	100	100	100
24. UNDER ROOF	100	100	100	100	100	100	100	100	100
25. ROOF	100	100	100	100	100	100	100	100	100
26. UNDER FLOOR	100	100	100	100	100	100	100	100	100
27. UNDER ROOF	100	100	100	100	100	100	100	100	100
28. ROOF	100	100	100	100	100	100	100	100	100
29. UNDER FLOOR	100	100	100	100	100	100	100	100	100
30. UNDER ROOF	100	100	100	100	100	100	100	100	100
31. ROOF	100	100	100	100	100	100	100	100	100
32. UNDER FLOOR	100	100	100	100	100	100	100	100	100
33. UNDER ROOF	100	100	100	100	100	100	100	100	100
34. ROOF	100	100	100	100	100	100	100	100	100
35. UNDER FLOOR	100	100	100	100	100	100	100	100	100
36. UNDER ROOF	100	100	100	100	100	100	100	100	100
37. ROOF	100	100	100	100	100	100	100	100	100
38. UNDER FLOOR	100	100	100	100	100	100	100	100	100
39. UNDER ROOF	100	100	100	100	100	100	100	100	100
40. ROOF	100	100	100	100	100	100	100	100	100
41. UNDER FLOOR	100	100	100	100	100	100	100	100	100
42. UNDER ROOF	100	100	100	100	100	100	100	100	100
43. ROOF	100	100	100	100	100	100	100	100	100
44. UNDER FLOOR	100	100	100	100	100	100	100	100	100
45. UNDER ROOF	100	100	100	100	100	100	100	100	100
46. ROOF	100	100	100	100	100	100	100	100	100
47. UNDER FLOOR	100	100	100	100	100	100	100	100	100
48. UNDER ROOF	100	100	100	100	100	100	100	100	100
49. ROOF	100	100	100	100	100	100	100	100	100
50. UNDER FLOOR	100	100	100	100	100	100	100	100	100
51. UNDER ROOF	100	100	100	100	100	100	100	100	100
52. ROOF	100	100	100	100	100	100	100	100	100
53. UNDER FLOOR	100	100	100	100	100	100	100	100	100
54. UNDER ROOF	100	100	100	100	100	100	100	100	100
55. ROOF	100	100	100	100	100	100	100	100	100
56. UNDER FLOOR	100	100	100	100	100	100	100	100	100
57. UNDER ROOF	100	100	100	100	100	100	100	100	100
58. ROOF	100	100	100	100	100	100	100	100	100
59. UNDER FLOOR	100	100	100	100	100	100	100	100	100
60. UNDER ROOF	100	100	100	100	100	100	100	100	100
61. ROOF	100	100	100	100	100	100	100	100	100
62. UNDER FLOOR	100	100	100	100	100	100	100	100	100
63. UNDER ROOF	100	100	100	100	100	100	100	100	100
64. ROOF	100	100	100	100	100	100	100	100	100
65. UNDER FLOOR	100	100	100	100	100	100	100	100	100
66. UNDER ROOF	100	100	100	100	100	100	100	100	100
67. ROOF	100	100	100	100	100	100	100	100	100
68. UNDER FLOOR	100	100	100	100	100	100	100	100	100
69. UNDER ROOF	100	100	100	100	100	100	100	100	100
70. ROOF	100	100	100	100	100	100	100	100	100
71. UNDER FLOOR	100	100	100	100	100	100	100	100	100
72. UNDER ROOF	100	100	100	100	100	100	100	100	100
73. ROOF	100	100	100	100	100	100	100	100	100
74. UNDER FLOOR	100	100	100	100	100	100	100	100	100
75. UNDER ROOF	100	100	100	100	100	100	100	100	100
76. ROOF	100	100	100	100	100	100	100	100	100
77. UNDER FLOOR	100	100	100	100	100	100	100	100	100
78. UNDER ROOF	100	100	100	100	100	100	100	100	100
79. ROOF	100	100	100	100	100	100	100	100	100
80. UNDER FLOOR	100	100	100	100	100	100	100	100	100
81. UNDER ROOF	100	100	100	100	100	100	100	100	100
82. ROOF	100	100	100	100	100	100	100	100	100
83. UNDER FLOOR	100	100	100	100	100	100	100	100	100
84. UNDER ROOF	100	100	100	100	100	100	100	100	100
85. ROOF	100	100	100	100	100	100	100	100	100
86. UNDER FLOOR	100	100	100	100	100	100	100	100	100
87. UNDER ROOF	100	100	100	100	100	100	100	100	100
88. ROOF	100	100	100	100	100	100	100	100	100
89. UNDER FLOOR	100	100	100	100	100	100	100	100	100
90. UNDER ROOF	100	100	100	100	100	100	100	100	100
91. ROOF	100	100	100	100	100	100	100	100	100
92. UNDER FLOOR	100	100	100	100	100	100	100	100	100
93. UNDER ROOF	100	100	100	100	100	100	100	100	100
94. ROOF	100	100	100	100	100	100	100	100	100
95. UNDER FLOOR	100	100	100	100	100	100	100	100	100
96. UNDER ROOF	100	100	100	100	100	100	100	100	100
97. ROOF	100	100	100	100	100	100	100	100	100
98. UNDER FLOOR	100	100	100	100	100	100	100	100	100
99. UNDER ROOF	100	100	100	100	100	100	100	100	100
100. ROOF	100	100	100	100	100	100	100	100	100



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PARC MAISON CENTRE CULTUREL
BLOCC 5 C.C.

GROUND FLOOR PLAN
Scale: 1/500
Date: 10/10/2000
Author: [Name]
Checked: [Name]

APPENDIX E – CRACK GAUGE MONITOR TECHNICAL DATASHEET

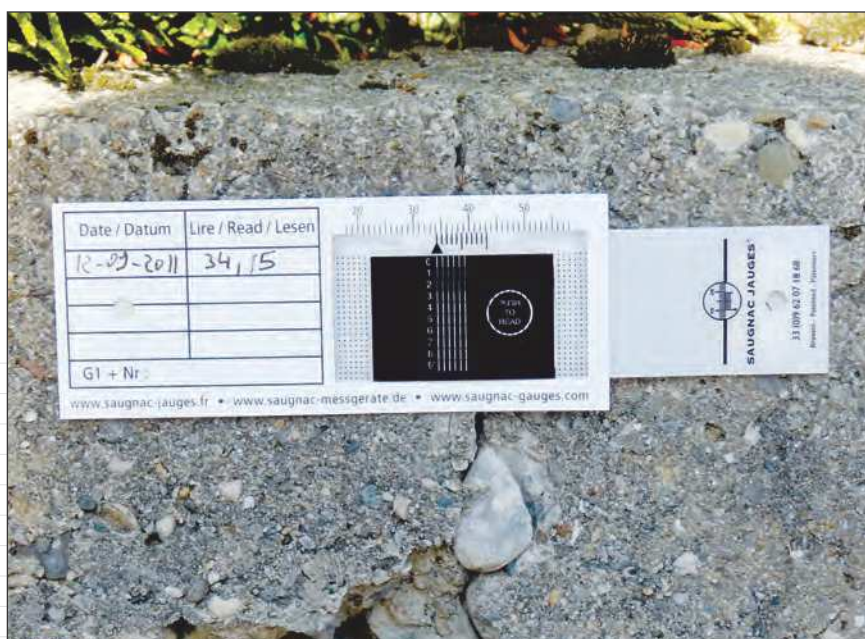
○ **G1+ GAUGE**

G1+ gauge with 1/20 mm precision

The G1+ gauge, like the other G1 family gauges, is suitable for monitoring parallel lip cracks progressing along a single axis.

It is white, the body of the gauge is made from extruded PVC and the pull tab is made from Lexan.

- Tensile strength of circa 25 g
- Plate thickness = 0.7 mm
- Pull tab thickness = 0.5 mm



It is weather-resistant

The device is fixed by means of double-sided adhesive tape.

G1+ gauges also have two 4mm diameter drill holes for mechanical fixing, using impact anchors, onto difficult substrates on which the use of adhesive tape or glue is inappropriate.

The major innovation provided by the G1+ gauge resides in its “digital” readout of tenths of mm: indeed, each 1/10 mm movement of the pull tab causes the concomitant obstruction of a row of 6 white lights placed on this same tab. Each row is assigned to a digit (0 to 9) corresponding to the tenths of mm.



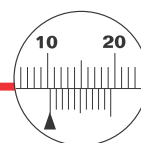
The G1+ gauge is manufactured in France

The tools, measurements, expertise, and service

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The brand for the expert

Reading examples

G1+ gauge reading on 12/09/2011

The ▲ mark on the vernier is located between 34 and 35

a) Reading the mm

The number of mm corresponds to the graduation to the left of the ▲ mark on the vernier:

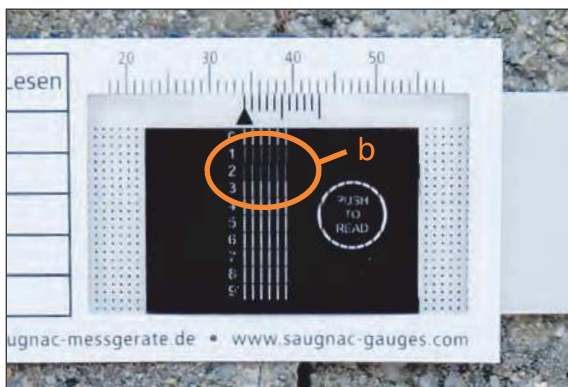
34 in the example shown

b) Reading the decimal

Identify the obstructed row(s).

In this example, rows 1 and 2 are obstructed, meaning that the ▲ mark on the vernier is mid-way between the first and second tenth.

The reading is thus neither 34.10 mm, nor 34.20 mm but 34.15 mm



Reading of the same G1+ gauge on 14/12/2011

The ▲ mark on the vernier is located between 34 and 35

a) Reading the mm

The number of mm corresponds to the graduation to the left of the ▲ mark on the vernier:

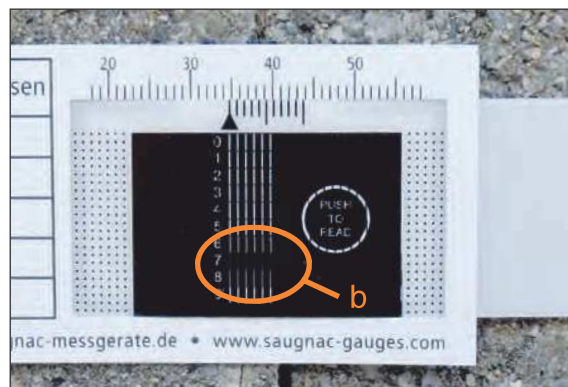
34 in the example shown

b) Reading the decimal

Identify the obstructed row(s) (black rows).

In this example, only row 7 is black, meaning that the ▲ mark on the vernier is positioned exactly on the seventh tenth.

The reading is thus 34.70 mm



By subtracting the first from the second reading, we can infer that the crack has grown by 0.55 mm in a little more than 3 months.

The vernier, located on the top of the pull tab, will confirm these results if necessary (for instructions on reading the vernier, see the G1 gauge product sheet), though it will be necessary to use a thread counter to read the result of 34.15.

Besides its 1/20 mm precision, combined with its ease and comfort of reading, the G1+ gauge also means:

- the ability to measure movements with an amplitude of up to 30mm

- no need to zero the instrument upon fixing: it is not necessary to align the ▲ on the vernier with a measurement scale graduation, an operation frequently difficult to perform with any degree of precision. Simply fix the gauge and read the result displayed

- a sufficiently flexible material to adapt to and follow the movement of irregular, convex or concave surfaces