



TEST RESULTS 1st SELF HEALING PERIOD

42 days



PROJECT REPAIR TOP DECK CRUISE PIER

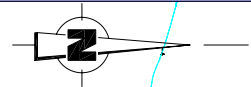
With Self-Healing Concrete Solutions

Basilisk-Caribbean

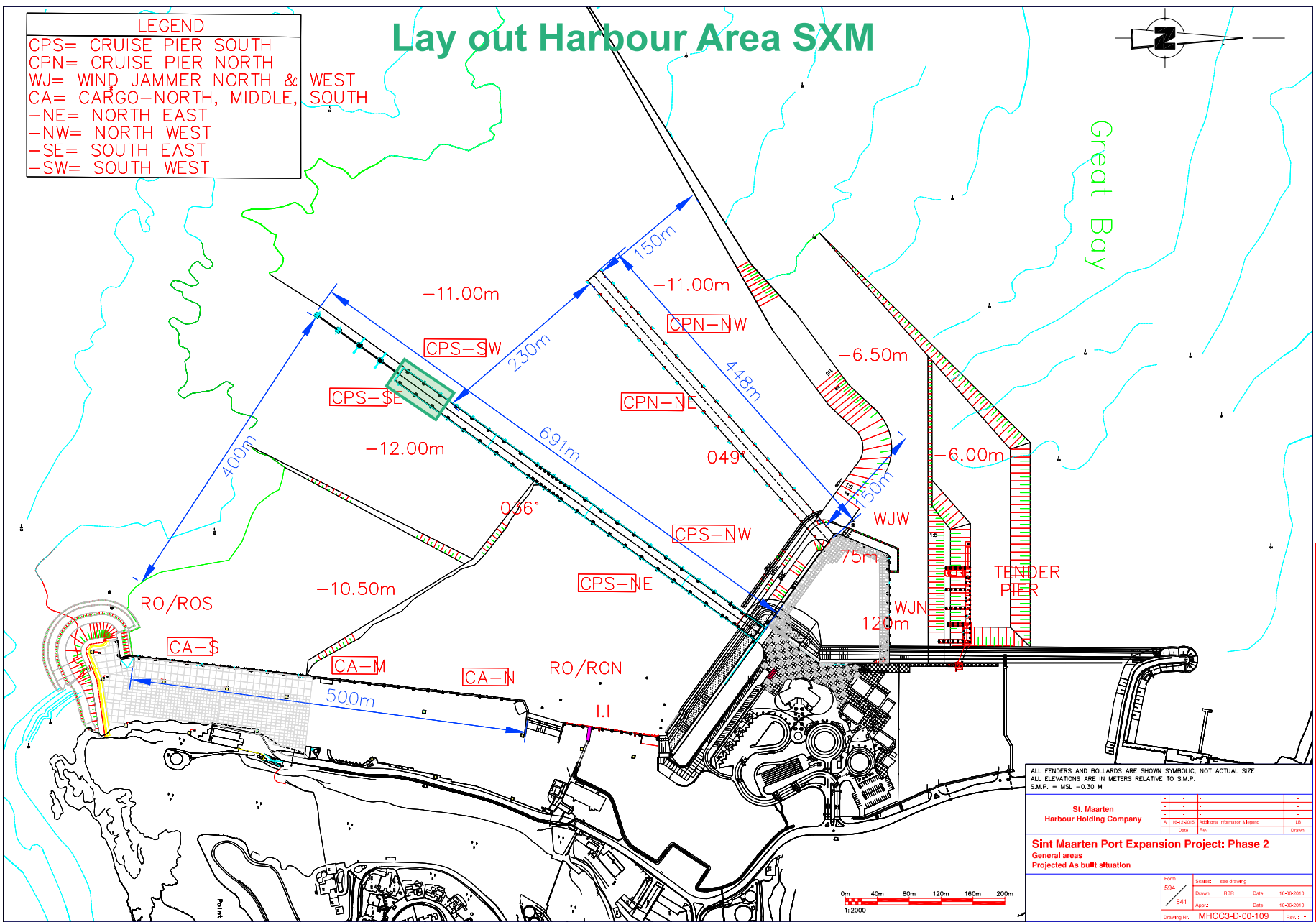
Project no.: BC-2021-001



Lay out Harbour Area SXM



LEGEND	
CPS=	CRUISE PIER SOUTH
CPN=	CRUISE PIER NORTH
WJ=	WIND JAMMER NORTH & WEST SOUTH
CA=	CARGO-NORTH, MIDDLE, SOUTH
-NE=	NORTH EAST
-NW=	NORTH WEST
-SE=	SOUTH EAST
-SW=	SOUTH WEST



ALL FENDERS AND BOLLARDS ARE SHOWN SYMBOLIC, NOT ACTUAL SIZE
ALL ELEVATIONS ARE IN METERS RELATIVE TO S.M.P.
S.M.P. = MSL -0.30 M

St. Maarten Harbour Holding Company			
Drawn	Rev.	Additional Information & Legend	UR
Date	Rev.	Date	Drawn

Sint Maarten Port Expansion Project: Phase 2
General areas
Projected As built situation

Form 594	Scale: see drawing
Drawn: RBR	Date: 14-05-2019
Appr: [Signature]	Date: 14-05-2019
Drawing No. MHCC3-D-00-109	Rev.: -



TEST RESULTS

1. Findings in 1st period from starting day 26 May 2021 till 21 days:

- Core No. 0 & 0.1; drilling cracks on starting day pilot 26 May 2021, for details see Test Result-1 at page 6
- Trenches prepared for MR3 repairs, some in combination with ER7 treatment, for locations see Test Location Overview at page 5
- Cracks and surfaces on power washed and contaminated areas treated with ER7, for locations see Test Location Overview at page 5
- During week 1, 2, 3 daily moistening the treated areas photos taken of the surfaces, which showed some minor visual changes of the healing process, photos filed.
- Findings:
 - Crack widths vary from 0.2 mm till over 1.0 mm
 - Concrete surface is heavily contaminated
 - Cores falling apart, cracks through - through

2. Findings ER7 REPAIRS in 1st period after 21 days, tests on 16 June 2021:

- Test Result 2.1: Healing process on going, visual perceived Page 7, 8
- Test Result 2.2: Healing process on going, visual perceived, core broken no visual healing noticed at the core Page 9
- Test Result 2.3: Healing process on going, visual perceived, core split and healing traces noticed inside core Page 10, 11
- Test Result 2.4: Healing process on going, visual perceived, crack is healing above reinforcement steel Page 12
- During week 4, 5, 6 daily moistening the treated areas photos taken of the surfaces, which showed some minor visual changes of the healing process, photos filed.

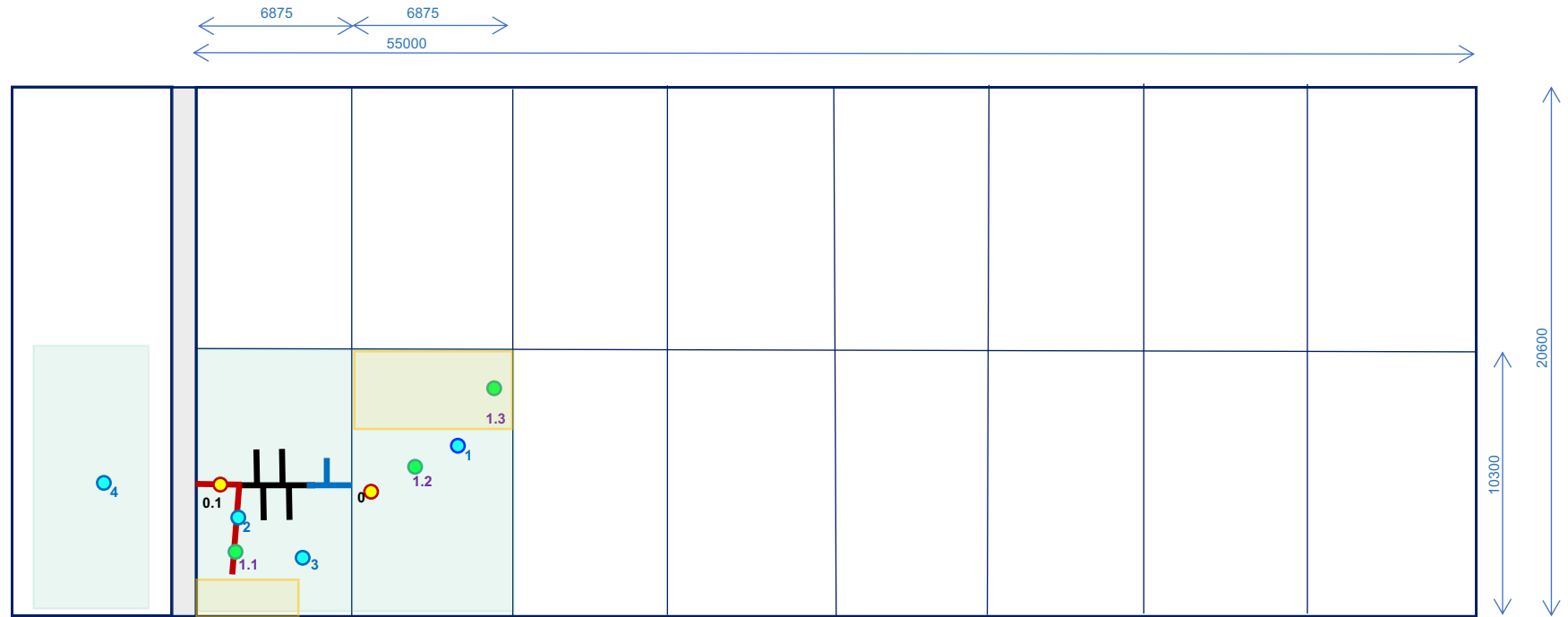
3. Findings ER7 REPAIRS after 1st period of 42 days

- Test Result 3.1: Healing process on going, visual perceived, core split, cracks not fully healed Page 13, 14
- Test Result 3.2: Healing process on going, visual perceived, core broken, cracks partly healed Page 15, 16
- Test Result 3.3: Healing process on going, visual perceived, surface healed, cracks noticed in lower part core Page 17
- Test Result 4.0: Follow up healing process of test result 1, visual perceived, cracks partly healed Page 18
- Test Result 4.1: Follow up healing process of test result 2.1, visual perceived, cracks partly healed Page 19
- Test Result 4.2: Follow up healing process of test result 2.2, visual perceived, combination MR3 repair Page 20
- Test Result 4.3: Follow up healing process of test result 2.3, visual perceived, visual healing equal after 21 days Page 21
- Test Result 5: Follow up healing process of test result 2.4, visual perceived, crack partly healed near reinforcement steel Page 21

4. Finding MR3 REPAIRS after 1st period of 42 days

- Test Result 6: Healing process finished; example of core show the core shows a homogeneous structure between the MR3 and the existing concrete Page 23

TEST LOCATION OVERVIEW



Dimensions in mm

- M3_30 - 60mm Repair + ER7 treatment
- M3 Repair_30mm
- M3 Repair_20mm

ER7 Surface treatment

Start healing process

- Core 1: 26 May 2021
- Core 2: 26 May 2021

21 Days healing process

- Core 1: 16 June 2021 & 6 July 2021
- Core 2: 16 June 2021 & 6 July 2021
- Core 3: 16 June 2021 & 6 July 2021
- Core 4: 16 June 2021 & 6 July 2021

42 Days healing process

- Core 1.1: 6 July 2021
- Core 1.2: 6 July 2021
- Core 1.3: 6 July 2021

TEST RESULT 1

● Cores 1 [0] & 2 [0.1] : Start date 26 May 2021

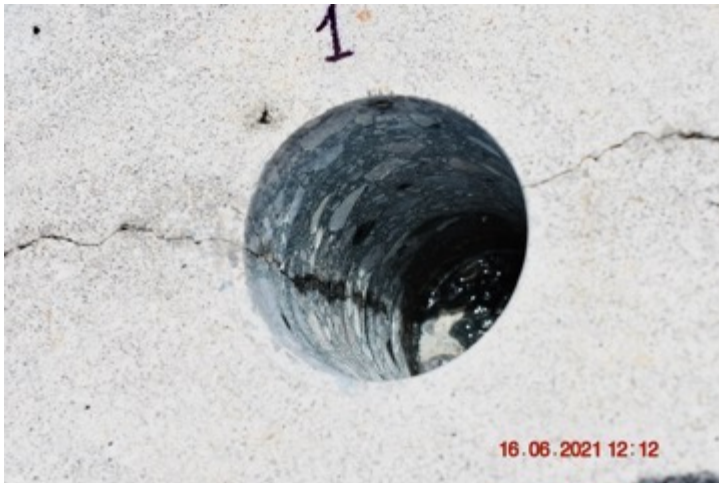


Findings 26 May 2021:

- Core 1 \varnothing 50 mm - length 150 mm / Core 2 \varnothing 50 mm - length 90 mm
- The majority of cracks founded were between 0.4 mm and > 1.0 mm, the cores fell apart.
- The depth of cracks were up to the reinforcement steel or in some cases through and through the concrete top layer of c. 250 mm

TEST RESULT 2.1.1

- Core 1 : Self Healing process at 21 days

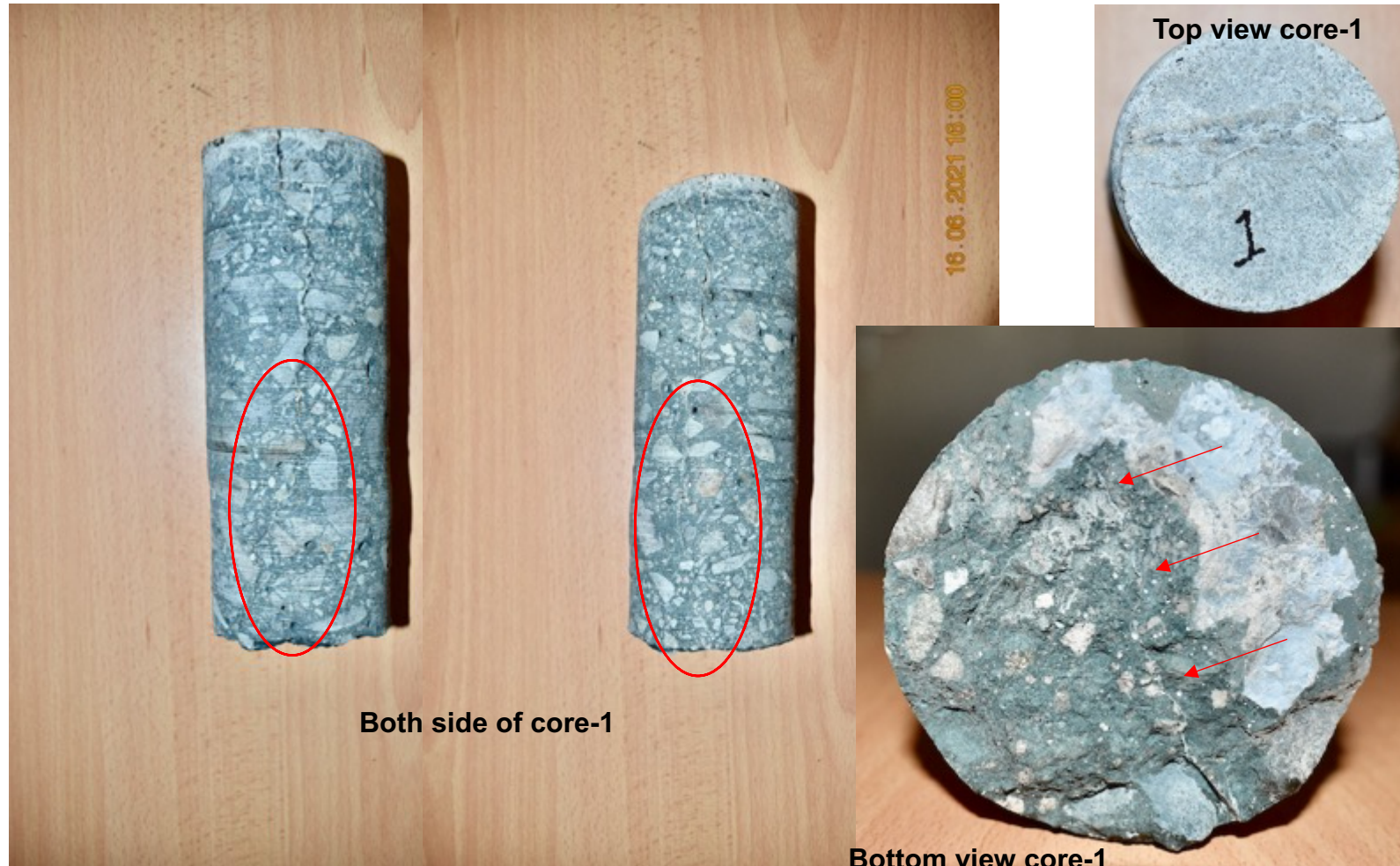


Findings 16 June 2021:

- Core \varnothing 50 mm - length 200 mm
- Healing process after 21 days between 10 - 50 mm from the bottom side of the core

TEST RESULT 2.1.2

- Core 1: Self Healing process at 21 days



Findings 16 June 2021:

- Healing process started, see details core 1 at the bottom side of the core.
- Top view of core 1 shows traces of pollution and calcification in and the around the crack

TEST RESULT 2.2.

- Core 2 : Self Healing process at 21 days



Findings 16 June 2021:

- Core \varnothing 50 mm - length 180 mm
- Healing process after 21 days between at the bottom side of the core hole, still water-fluid found in core hole
- Cracks are partly healed.
- Core broke in pieces during core drilling, no healing process could be detected

TEST RESULT 2.3.1

- Core 3 : Self Healing process at 21 days



Findings 16 June 2021:

Core \varnothing 50 mm - length 100 mm

Healing process after 21 visual inside core hole noticed, cracks are not fully healed.

TEST RESULT 2.3.2

- Core 3 : Self Healing process at 21 days



Findings 16 June 2021:

- Healing process after 21 days in the core hole noticed
- Core after pressure test split into 2 pieces, see results of the ER7 liquid penetrated in the concrete core sides, which had been spliced on the crack.
- Cracks are partly healed.

TEST RESULT 2.4

- Core 4 : Self Healing process at 21 days



Findings 16 June 2021:

- Core \varnothing 50 mm - length 80 mm
- Location at original pier-deck [first layer] construction.
- Healing process started above reinforcement steel
- Cracks are partly healed

TEST RESULT 3.1

● Core 1.1: Self Healing process at 42 days



Findings 6 July 2021:

- New Core \varnothing 50 mm - length 180 mm at 60 mm trace depth
- Partly healing process, compaction of porosity surface and crack healing - cracks are partly healed
- Note: trench was almost all 42 days filled with water

TEST RESULT 3.1

- Core 1.1: Self Healing process at 42 days



Findings 6 July 2021:

- Partly healing process 42 days
- Core split in two pieces after some minor pressure
- Crack partly healed

TEST RESULT 3.2.1

- Core 1.2: Self Healing process at 42 days



Findings 6 July 2021:

- New Core \varnothing 50 mm - length 200 mm
- Location in power washed area and surface treatment.
- Partly healing process - compaction of porosity top layer of the concrete - crack partly healed

TEST RESULT 3.2.2

- Core 1.2: Self Healing process at 42 days

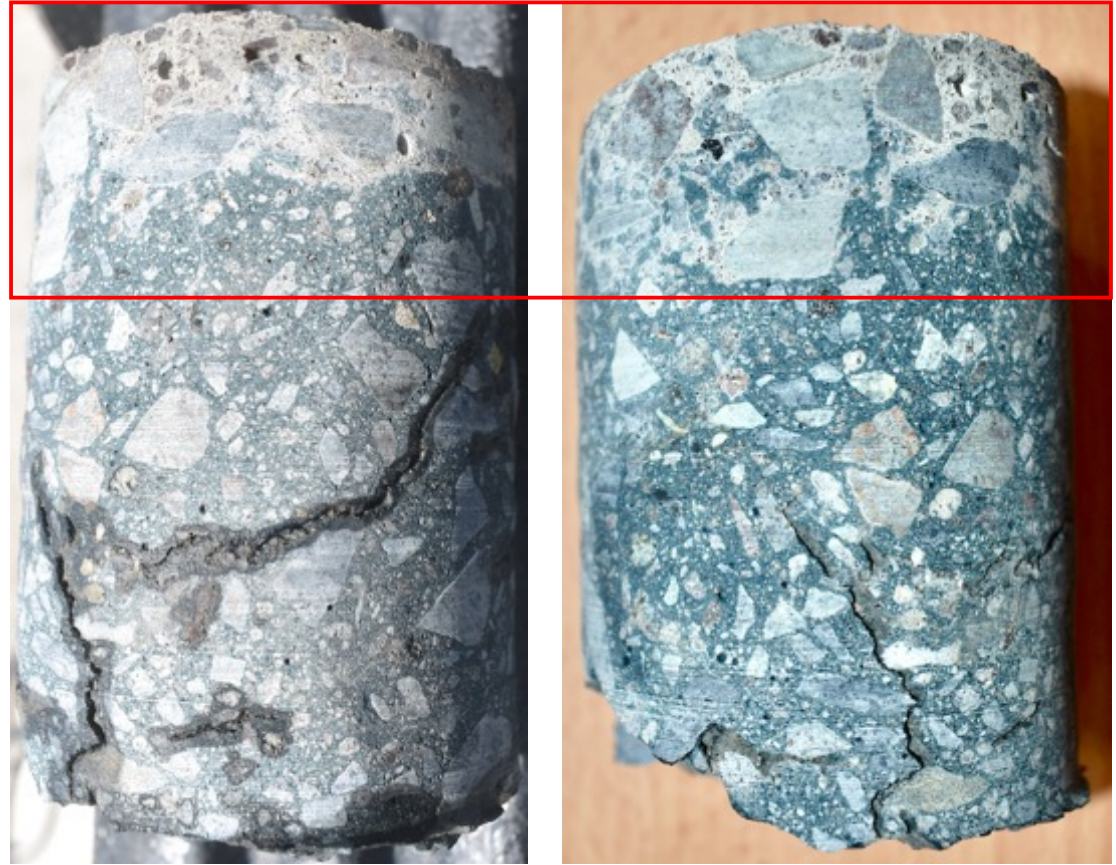


Findings 6 July 2021:

- Partly healing process - crack repair from surface area - advanced healing

TEST RESULT 3.3

- Core 1.3: Self Healing process at 42 days

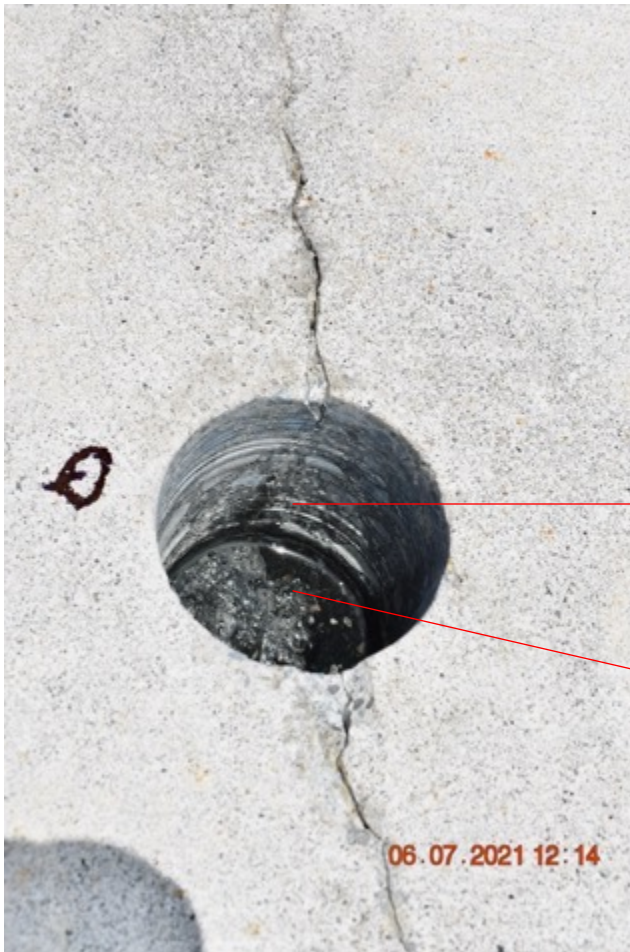


Findings 6 July 2021:

- New Core \varnothing 50 mm - length 100 mm
- Location in power washed area and surface treatment.
- Healing process, compaction of porosity top layer of the concrete

TEST RESULT 4.0

- Core Hole 0 [16June2021]: Self Healing process at 42 days



Findings 6 July 2021:

- See Test Result 1 - page 6
- Continue healing process
- Cracks partly healed

TEST RESULT 4.1

- Core Hole 1 [16June2021]: Self Healing process at 42 days



Findings 6 July 2021:

- See Test Result 2.1 - page 7, 8
- Continue healing process
- Cracks partly healed

TEST RESULT 4.2

● Core Hole 2 [16June2021]: Self Healing process at 42 days

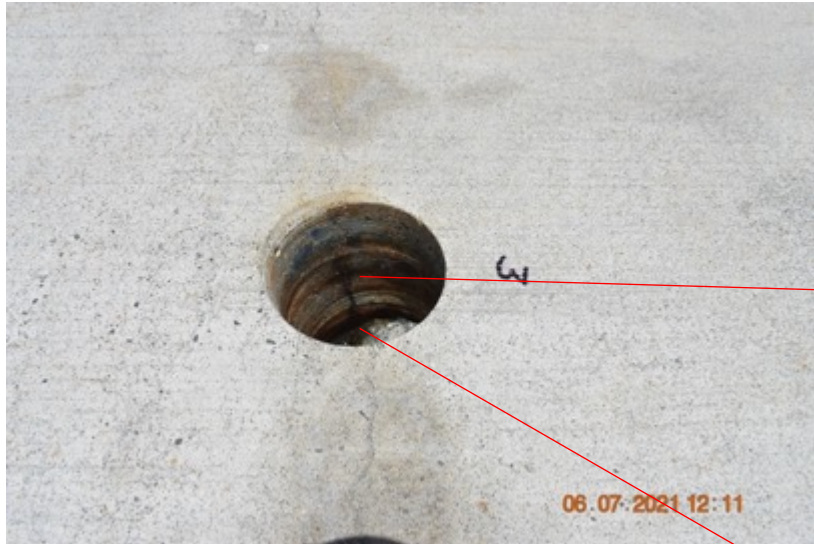


Findings 6 July 2021:

- See Test Result 2.2 - page 9
- Continue healing process
- Cracks partly healed
- Surface healing noticed
- Trench was full of water before inspection

TEST RESULT 4.3

- Core Hole 3 [16June2021]: Self Healing process at 42 days



Findings 6 July 2021:

- See Test Result 2.3 - page 10, 11
- Crack partly healed
- Comparable to Test Result 2.3

TEST RESULT 5

● Core Hole 4 [16June2021]: : Self Healing process at 42 days



Findings 6 July 2021:

- See Test Result 2.4 _ page 12
- Location in power washed area old original concrete deck which is heavily contaminated
- Cracks partly healed

TEST RESULT 6

MR3: Self Healing Repairs



Findings 16 June and 6 July 2021:

- MR3 trench repair of 20 mm & 30 mm:
- MR3 trench repair of 60 mm:
- ER7 & MR3 trench repair of 60 mm:

Application with 1 layer of MR3 mortar

Application with 2 layers of 30mm MR3 mortar

Application of 1 treatment of ER7 and 2 layers of 30mm MR3 mortar

CONCLUSION - CONTINUATION - RECOMMENDATIONS

1a. Conclusion ER7 TREATMENT - 1, after 42 days

- The crack with a crack width up to 0.3 mm - 0.4 mm has been partly - almost completely healed:
 - Surficial cracks almost completely healed, see;
 - [Test Result 3.3.2 _ page 16]
 - Deeper and through & through cracks have been partly healed, in these cases the healing starts at the bottom of the most narrow part of the crack, see;
 - [Test Result 2.4 _ page 12 & Test Result 3.1 _ page 13, 14]
- Cracks with a crack-width larger dan 0.3 has been partly - or not healed in certain crack sections shown at the majority of the test results
- Surface treatment shows he maximum achievable surface compaction with this concrete quality after 1 treatment of ER7, see:
 - [Test Result 3.3 _ page 17]
- We noticed that the progress of the healing process was most observed [most visuable] in the 1st period of 21 days

1b. Conclusion MR3 TREATMENT

- The repairs with the MR3 repair mortar shown a fully homogenous repair result
 - [Test Result 6 _ page 20]

1c. Other Remarks

- We have noticed that the porosity of the concrete is quite high
- We have noticed that not visible cracks at the surface have been observed during the drilling of the cores, see;
 - [Test Result 3.3 _ page 17]
- The whole crack pattern is concerning with possible constructive consequences

2. Continuation

- Due to the depth of the cracks and larger crack width, another treatment with ER7 [2nd period of 42 days] is required to further optimize the healing process

3. Recommendation

- In regard of possible constructive consequences, it is recommended to arrange a further constructive review by a Structural Engineer.