

Corrosion Survey Report



Report Title Corrosion Survey – Samuda Estate Car Park

Location Isle of Dogs, UK

Client One Housing Group

Date 16th October 2017

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1.0 EXECUTIVE SUMMARY

A survey of concrete elements to the Samuda Estate underground garage and external walls was carried out week commencing 21st August 2017. The aim was to determine the cause and extent of corrosion damage and to recommend repair and protection options to extend the life of the structure and minimise future maintenance expenditure.

Localised areas of concrete spalling were observed to both internal and external concrete elements. Internally the damage is most evident to soffits and beams located in the southern section of the structure. Testing confirmed that this has largely been driven by moisture and chloride ingress from the podium deck due to defective waterproofing, exacerbated by carbonation in some locations. Externally the visible damage was found to be due to carbonation and localised low concrete cover to the steel reinforcement.

Concrete repair works are required to make good existing damage. In addition, it is recommended that action is taken to control the spread of corrosion and to protect the concrete from carbonation and moisture ingress. Recommendations made in this report for remedial action should be implemented in conjunction with remedial works to the podium deck waterproofing to prevent further moisture and chloride penetration from above.

The cost shown under each option is the total estimated cost of maintenance over years 1 – 30. It is important to note that Option A includes for the maintenance of key structural concrete elements, in support of the buildings and areas over. Option B adds full protection of the car park deck isles and parking bays. Whilst the car park could be used with line markings only, it is recommended that full protection be provided to prevent deterioration of the deck, and associated increased maintenance costs.

The results of this survey exclude podium deck waterproofing and also mechanical and electrical services and gates/doors to ingress/egress car park.

Option A

Repair corrosion induced damage to concrete elements, install sacrificial anodes to limit further corrosion and apply protective coatings (excluding car park deck).

Estimated Cost of works: £706,250 (over 30 year period)

Option B

Carry out works as per Option A plus apply protective coating system to car park deck driving isles and bays. As well as providing a barrier to moisture and chloride ingress, a deck coating system will upgrade the aesthetic appeal of the structure and, along with line markings, clearly delineate isles from bays and direct traffic safely around the structure.

Estimated Cost of Works: £1,223,750 (over 30 year period)

2.0 INTRODUCTION

CPT were commissioned to undertake a corrosion condition assessment of the Samuda Estate Car Park garage, both the underground structure and the external surfaces above ground. The structure is located in the Isle of Dogs, London.

The aim of the continuity, half-cell, carbonation and chloride profiling testing undertaken on this structure was to assess and report with respect to:

- The current state of the reinforced concrete elements with particular emphasis on the corrosion of steel reinforcement.
- The likely causes and factors contributing to the corrosion condition of the structure.
- Suggested remedial actions to prevent further/future corrosion damage to the structure.

This report will detail the techniques used, data obtained and suggested refurbishment options.

3.0 TEST METHODOLOGY

Test data was obtained between 21st and 24th August 2017. Temperature was ~15C during testing.

3.1 Reinforcement Electrical Continuity Testing

Reinforcement continuity testing, following guidelines in ISO12696:2016, was undertaken by breaking away the cover to the steel reinforcement or using pre-exposed reinforcement and generating a cleaned section of steel. Using a multimeter, the continuity between two respective rebars was tested. This was undertaken between various locations on the structure.

Reinforcement continuity is signified by a stable resistance reading of less than 1Ω (ohm) or 1mV when the resistance of any cabling/test leads is subtracted from the overall resistance [1].

3.2 Concrete cover testing

A calibrated Elcometer 331 cover meter was used to identify the lowest concrete cover to steel reinforcement at the various test locations across the structure. Typically, a grid at 500mm centres was utilised to determine lowest cover locally.

3.3 Steel Half-cell potential survey

A calibrated copper sulphate reference electrode was used to obtain steel reinforcement potentials from the concrete surface, utilising a moist sponge placed on the end of a porous electrode plug. The steel potentials were obtained using a high impedance voltmeter connected to the Copper/Copper Sulphate reference electrode. Procedures detailed in Concrete Society Technical Report 60 were followed [2].

Steel potential measurements were obtained by pressing the reference probe onto the surface of the selected element and recording the stable potential reported on the multimeter. Readings were taken on a 500mm grid.

3.4 Chloride profiling

A 110V percussive drill fitted with a 15-mm drill bit was used to collect all concrete dust samples for chloride analysis. The first 5 mm of concrete cover was drilled and discarded before any remaining dust was blown from the hole using an air pump. The same procedure was used to collect dust samples at three incremental depths: 5 to 25 mm, 25 to 50 mm and 50 to 75 mm. The dust displaced by the drilling at each incremental depth was collected in a labelled plastic sample container. Testing locations can be found in Appendix A

A concrete cement content of 14% was assumed in calculating chloride content. Procedures detailed in Concrete Society Technical Report 60 [2] were followed.

The dust samples collected were analysed at a UKAS accredited testing laboratory.

3.5 Carbonation Testing

Concrete carbonation depth was determined using a 50% phenolphthalein solution sprayed onto freshly exposed concrete surfaces from break outs, following procedures detailed in Concrete Society Technical Report 60. Carbonation depth is taken at the point where the indicator turns pink. Testing locations can be found in Appendix A

3.6 Hammer tap & visual defects survey

A rebound hammer was used to strike the surface of the concrete to listen for any hollow sounding areas which indicate delaminated concrete. Furthermore any visual defects such as cracks/visible reinforcement were also marked onto a series of defect drawings.

4.0 RESULTS

The results from testing the various elements of the Samuda Estate Car Park are detailed below;


4.1 Reinforcement Electrical Continuity

Electrical continuity throughout the structure was found to be very good with readings of less than 1 Ohm/1.0mV between the separate sections of exposed steel tested.

4.2 Steel half-cell potential survey and concrete cover to reinforcement

Steel potential measurements were taken on a 500-mm grid across the surface of each element selected for testing. The results are recorded below. Testing locations can be found in Appendix A.

Key to Steel Potential Readings

| | |
|-------------------------------------------------------------------------------------|------------------|
|  | > -200mV |
|  | = -200 to -349mV |
|  | < -350mV |

All readings are relative a copper sulphate reference electrode.

SU1 – Wall

| SU1 - Half Cell | | | | | |
|-----------------|-----|------|------|------|-----|
| | A | B | C | D | E |
| 1 | 105 | 105 | -27 | 30 | 70 |
| 2 | 75 | 56 | -169 | 22 | 52 |
| 3 | 38 | -21 | -38 | 18 | 51 |
| 4 | -77 | -139 | -92 | -149 | -58 |

| SU1 - Cover | | | | | |
|-------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 46 | 60 | 54 | 56 | 70 |
| 2 | 54 | 51 | 61 | 60 | 64 |
| 3 | 60 | 70 | 61 | 64 | 60 |
| 4 | 55 | 65 | 50 | 55 | 53 |

Average Cover; [58mm]



SU2 – Garage Beam

| SU2 - Half Cell | | | | | |
|-----------------|-----|-----|-----|-----|-----|
| | A | B | C | D | E |
| 1 | 147 | 150 | 138 | 150 | 148 |
| 2 | 156 | 152 | 150 | 172 | 178 |

| SU2 - Cover | | | | | |
|-------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 60 | 73 | 63 | 65 | 73 |
| 2 | 68 | 62 | 50 | 54 | 55 |

Average Cover; [62mm]



SU3 – Main Beam

| SU3 - Half Cell | | | | | |
|-----------------|-----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 110 | 93 | 76 | 86 | 88 |
| 2 | 105 | 90 | 91 | 96 | 93 |

| SU3 - Cover | | | | | |
|-------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 70 | 73 | 64 | 73 | 69 |
| 2 | 65 | 68 | 43 | 40 | 48 |

Average Cover; [61mm]



SU6 – Column

| SU6 - Half Cell | |
|-----------------|------|
| | A |
| 1 | 105 |
| 2 | 41 |
| 3 | 10 |
| 4 | 3 |
| 5 | -125 |

| SU6 - Cover | |
|-------------|----|
| | A |
| 1 | 55 |
| 2 | 42 |
| 3 | 35 |
| 4 | 41 |
| 5 | 51 |

Average Cover; [45mm]

SU8 – Garage Beam

| SU8 - Half Cell | | | | | |
|-----------------|-----|-----|-----|----|-----|
| | A | B | C | D | E |
| 1 | 127 | 137 | 142 | 80 | 148 |
| 2 | 130 | 151 | 134 | 30 | 139 |

| SU8 - Cover | | | | | |
|-------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 49 | 51 | 49 | 48 | 60 |
| 2 | 52 | 69 | 43 | 58 | 62 |

Average Cover; [54mm]

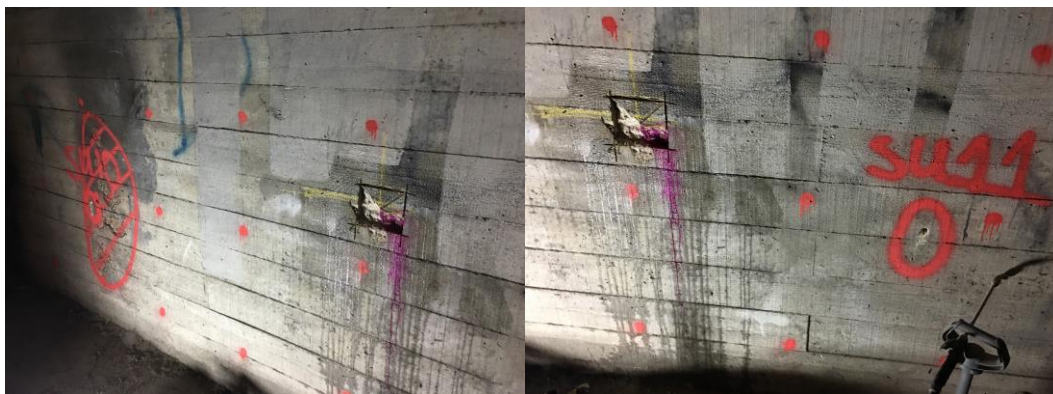


SU10-11 – Internal Wall

| SU10-SU11 - Half Cell | | | | | | | | | |
|-----------------------|-----|-----|----|-----|-----|----|----|-----|-----|
| | A | B | C | D | E | F | G | H | I |
| 1 | 102 | 108 | 87 | 98 | 109 | 92 | 99 | 102 | 104 |
| 2 | 106 | 84 | 37 | 74 | 80 | 78 | 68 | 50 | 39 |
| 3 | 30 | 28 | 34 | 52 | 39 | 67 | 45 | 60 | 32 |
| 4 | -48 | 13 | -9 | -11 | -13 | 14 | 33 | 21 | -19 |

| SU10-SU11 - Cover | | | | | | | | | |
|-------------------|----|----|----|----|----|----|----|----|----|
| | A | B | C | D | E | F | G | H | I |
| 1 | 15 | 38 | 51 | 54 | 51 | 51 | 41 | 40 | 40 |
| 2 | 25 | 35 | 49 | 55 | 65 | 65 | 43 | 39 | 34 |
| 3 | 34 | 41 | 54 | 60 | 62 | 62 | 51 | 42 | 31 |
| 4 | 52 | 45 | 53 | 55 | 69 | 69 | 67 | 44 | 39 |

Average Cover; [48mm]



SU12-14 – Internal Wall

| SU12-SU14 - Half Cell | | | | | | | |
|-----------------------|------|------|------|------|-----|------|------|
| | A | B | C | D | E | F | G |
| 1 | -76 | -77 | -28 | 15 | 52 | -2 | 11 |
| 2 | -29 | -14 | 14 | 29 | 46 | 54 | 63 |
| 3 | 16 | 24 | -25 | -64 | 39 | 56 | 37 |
| 4 | 0 | 3 | 19 | -28 | 42 | -1 | 24 |
| 5 | -168 | -130 | -111 | -151 | -82 | -120 | -110 |

| SU12-SU14 - Cover | | | | | | | |
|-------------------|----|----|----|----|----|----|----|
| | A | B | C | D | E | F | G |
| 1 | 42 | 43 | 33 | 44 | 52 | 51 | 55 |
| 2 | 46 | 50 | 47 | 47 | 49 | 53 | 45 |
| 3 | 46 | 49 | 47 | 44 | 46 | 52 | 72 |
| 4 | 17 | 40 | 39 | 38 | 40 | 40 | 41 |
| 5 | 48 | 49 | 48 | 65 | 48 | 48 | 43 |

Average Cover; [46mm]

SU16 – Soffit

| SU16 - Half Cell | | | |
|------------------|------|------|------|
| | A | B | C |
| 1 | -143 | -132 | -150 |
| 2 | -130 | -147 | -133 |
| 3 | -103 | -162 | -96 |

| SU16 - Cover | | | | |
|--------------|----|----|----|----|
| | A | B | C | D |
| 1 | 26 | 13 | 27 | 37 |
| 2 | 17 | 23 | 60 | 37 |
| 3 | 30 | 20 | 16 | 39 |

Average Cover; [28mm]

SU17 – Main Beam

| SU17 - Half Cell | | | | | | |
|------------------|-----|-----|-----|-----|-----|-----|
| | A | B | C | D | E | F |
| 1 | 164 | 104 | 105 | -42 | 62 | 83 |
| 2 | 148 | 124 | 42 | -72 | 95 | 123 |
| 3 | 68 | 67 | 82 | -10 | -29 | -26 |

| SU17 - Cover | | | | | | |
|--------------|----|----|----|----|----|----|
| | A | B | C | D | E | F |
| 1 | 32 | 28 | 30 | 68 | 35 | 35 |
| 2 | 26 | 20 | 10 | 21 | 23 | 36 |

Average Cover; [25mm]



SU18-20 – Internal Wall

| SU18-SU20 - Half Cell | | | | | |
|-----------------------|------|------|------|------|------|
| | A | B | C | D | E |
| 1 | 3 | -4 | -92 | 42 | 125 |
| 2 | -42 | -62 | -78 | 13 | 112 |
| 3 | 13 | 3 | -70 | 8 | 110 |
| 4 | -32 | 6 | -36 | 25 | 101 |
| 5 | -120 | 3 | 2 | 30 | 68 |
| 6 | -149 | -152 | -228 | -174 | -173 |

Average Half Cell Potential; [-25mV]

| SU18-SU20 - Cover | | | | | |
|-------------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 17 | 35 | 32 | 20 | 30 |
| 2 | 23 | 31 | 31 | 42 | 32 |
| 3 | 31 | 32 | 33 | 31 | 40 |
| 4 | 64 | 38 | 26 | 28 | 26 |
| 5 | 26 | 40 | 41 | 32 | 30 |
| 6 | 31 | 35 | 21 | 41 | 36 |

Average Cover; [32mm]



SU21 – Soffit

| SU21 - Half Cell | | | | |
|------------------|------|-----|-----|----|
| | A | B | C | D |
| 1 | 52 | 20 | -14 | 20 |
| 2 | -182 | 27 | 20 | 36 |
| 3 | -140 | 90 | 70 | 60 |
| 4 | -89 | 110 | 90 | 32 |
| 5 | 75 | 123 | 95 | 40 |
| 6 | 42 | 85 | 120 | 92 |

| SU21 - Cover | | | | |
|--------------|----|----|----|----|
| | A | B | C | D |
| 1 | 22 | 24 | 23 | 28 |
| 2 | 20 | 34 | 23 | 30 |
| 3 | 29 | 35 | 27 | 40 |
| 4 | 20 | 27 | 24 | 40 |
| 5 | 19 | 35 | 26 | 39 |
| 6 | 24 | 30 | 32 | 41 |

Average Cover; [28mm]



SU23 – Internal Wall

| SU23 - Half Cell | | | | | |
|------------------|-----|-----|----|-----|-----|
| | A | B | C | D | E |
| 1 | 100 | 92 | 80 | -9 | -68 |
| 2 | 132 | 157 | 70 | -20 | -85 |
| 3 | 117 | 116 | 87 | 76 | 72 |
| 4 | 104 | 121 | 26 | 60 | 28 |



SU24 – Internal Wall

| SU24 - Half Cell | | | | | |
|------------------|-----|-----|-----|-----|-----|
| | A | B | C | D | E |
| 1 | 56 | 105 | 120 | 108 | 93 |
| 2 | 102 | 111 | 31 | 111 | 118 |
| 3 | 98 | 95 | 80 | 100 | 104 |
| 4 | 58 | 57 | 102 | 73 | 74 |



SU25 – Soffit

| SU25 - Half Cell | | | |
|------------------|-----|-----|-----|
| | A | B | C |
| 1 | 36 | -12 | -12 |
| 2 | 10 | -85 | -28 |
| 3 | -10 | -12 | 40 |

| SU25 - Cover | | | |
|--------------|----|----|----|
| | A | B | C |
| 1 | 64 | 61 | 68 |
| 2 | 64 | 55 | 54 |
| 3 | 50 | 56 | 52 |

Average Cover; [58mm]

SU26 – Soffit

| SU26 - Half Cell | | | |
|------------------|----|-----|----|
| | A | B | C |
| 1 | 93 | 110 | 93 |
| 2 | 87 | 92 | 91 |
| 3 | 90 | 52 | 89 |

| SU26 - Cover | | | |
|--------------|----|----|----|
| | A | B | C |
| 1 | 40 | 47 | 42 |
| 2 | 37 | 42 | 55 |
| 3 | 49 | 45 | 40 |

Average Cover; [44mm]

SU27 – Main Beam

| SU27 - Half Cell | | | | | |
|------------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 2 | 53 | 50 | 62 | 58 |
| 2 | 20 | 64 | 51 | 91 | 75 |

| SU27 - Cover | | | | | |
|--------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 72 | 70 | 68 | 63 | 60 |
| 2 | 50 | 55 | 56 | 53 | 49 |

Average Cover; [60mm]



SU28 – Internal Wall

| SU28 - Half Cell | | | | | |
|------------------|-----|-----|-----|----|-----|
| | A | B | C | D | E |
| 1 | 86 | 118 | 115 | 93 | 93 |
| 2 | 69 | 94 | 110 | 91 | 87 |
| 3 | -8 | 44 | -46 | 67 | 61 |
| 4 | 100 | -63 | 65 | 4 | -41 |

| SU28 - Cover | | | | | |
|--------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 73 | 73 | 48 | 72 | 52 |
| 2 | 72 | 73 | 40 | 71 | 42 |
| 3 | 72 | 73 | 43 | 45 | 70 |
| 4 | 73 | 70 | 50 | 40 | 45 |

Average Cover; [60mm]

SU29 – Garage Beam

| SU29 - Half Cell | | | | | |
|------------------|-----|-----|-----|-----|-----|
| | A | B | C | D | E |
| 1 | 3 | 85 | 138 | 145 | 137 |
| 2 | 120 | 120 | 109 | 112 | 120 |

| SU29 - Cover | | | | | |
|--------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 50 | 69 | 67 | 34 | 59 |
| 2 | 44 | 47 | 57 | 30 | 68 |

Average Cover; [53mm]



SU30 – Column

| SU30 - Half Cell | |
|------------------|-----|
| | A |
| 1 | 124 |
| 2 | 150 |
| 3 | 120 |
| 4 | 111 |
| 5 | 30 |
| SU30 - Cover | |
| | A |
| 1 | 70 |
| 2 | 70 |
| 3 | 70 |
| 4 | 55 |
| 5 | 44 |

Average Cover; [62mm]



SU31 – 35 External Walls

| SU31 - Cover | | | |
|--------------|----|----|----|
| | A | B | C |
| 1 | 35 | 35 | 30 |
| 2 | 70 | 70 | 10 |
| 3 | 49 | 35 | 33 |

Average Cover; [31mm]



| SU32 & SU33 - Cover | | | | | | |
|---------------------|----|----|----|----|----|----|
| | A | B | C | D | E | F |
| 1 | 49 | 55 | 55 | 45 | 37 | 55 |
| 2 | 26 | 26 | 37 | 28 | 17 | 20 |

Average Cover; [37mm]



| SU34 - Cover | | | | | |
|--------------|----|----|----|----|----|
| | A | B | C | D | E |
| 1 | 20 | 30 | 40 | 40 | 40 |
| 2 | 17 | 21 | 23 | 20 | 40 |

Average Cover; [29mm]



| SU35 - Cover | | | |
|--------------|----|----|----|
| | A | B | C |
| 1 | 40 | 65 | 36 |
| 2 | 36 | 36 | 19 |
| 3 | 31 | 35 | 33 |

Average Cover; [34mm]



4.3 Chloride Content of Concrete

The chloride ion concentrations determined from the extracted samples, at locations identified in Appendix A, are detailed in Table 1 below. The chloride ion content is shown at 3 depths for each sample and is expressed as %chloride by mass of cement;

| Sample Reference | Sample Depth/mm | Chloride ion content (% by mass of cement) |
|------------------|-----------------|--------------------------------------------|
| SU1 | 5-25 | 0.15 |
| | 25-50 | 0.08 |
| | 50-75 | 0.14 |
| SU2 | 5-25 | 0.08 |
| | 25-50 | 0.09 |
| | 50-75 | 0.10 |
| SU3 | 5-25 | 0.06 |
| | 25-50 | 0.06 |
| | 50-75 | 0.09 |
| SU4 | 5-25 | 0.06 |
| | 25-50 | 0.16 |
| | 50-75 | 0.09 |
| SU5 | 5-25 | 0.08 |
| | 25-50 | 0.10 |
| | 50-75 | 0.07 |
| SU6 | 5-25 | 0.03 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU7 | 5-25 | 0.48 |
| | 25-50 | 0.39 |
| | 50-75 | 0.34 |
| SU8 | 5-25 | 0.07 |
| | 25-50 | 0.03 |

| | | |
|------|-------|------|
| | 50-75 | 0.03 |
| SU9 | 5-25 | 0.51 |
| | 25-50 | 0.65 |
| | 50-75 | 0.52 |
| SU10 | 5-25 | 0.06 |
| | 25-50 | 0.14 |
| | 50-75 | 0.14 |
| SU11 | 5-25 | 0.04 |
| | 25-50 | 0.11 |
| | 50-75 | 0.08 |
| SU12 | 5-25 | 0.12 |
| | 25-50 | 0.09 |
| | 50-75 | 0.03 |
| SU13 | 5-25 | 0.07 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU14 | 5-25 | 0.11 |
| | 25-50 | 0.07 |
| | 50-75 | 0.03 |
| SU15 | 5-25 | 0.05 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU16 | 5-25 | 0.18 |
| | 25-50 | 0.06 |
| | 50-75 | 0.05 |
| SU17 | 5-25 | 0.41 |
| | 25-50 | 0.23 |
| | 50-75 | 0.30 |
| SU18 | 5-25 | 0.19 |
| | 25-50 | 0.04 |
| | 50-75 | 0.03 |
| SU19 | 5-25 | 0.23 |
| | 25-50 | 0.24 |
| | 50-75 | 0.04 |
| SU20 | 5-25 | 0.26 |
| | 25-50 | 0.11 |
| | 50-75 | 0.09 |
| SU21 | 5-25 | 0.44 |
| | 25-50 | 0.95 |
| | 50-75 | 0.91 |
| SU22 | 5-25 | 0.07 |
| | 25-50 | 0.04 |
| | 50-75 | 0.07 |
| SU23 | 5-25 | 0.06 |
| | 25-50 | 0.11 |
| | 50-75 | 0.06 |
| SU24 | 5-25 | 0.06 |

| | | |
|------|-------|------|
| | 25-50 | 0.20 |
| | 50-75 | 0.03 |
| SU25 | 5-25 | 0.13 |
| | 25-50 | 0.10 |
| | 50-75 | 0.03 |
| SU26 | 5-25 | 0.05 |
| | 25-50 | 0.05 |
| | 50-75 | 0.03 |
| SU27 | 5-25 | 0.05 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU28 | 5-25 | 0.03 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU29 | 5-25 | 0.05 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU30 | 5-25 | 0.07 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU31 | 5-25 | 0.04 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU32 | 5-25 | 0.06 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU33 | 5-25 | 0.05 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU34 | 5-25 | 0.07 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |
| SU35 | 5-25 | 0.04 |
| | 25-50 | 0.03 |
| | 50-75 | 0.03 |

Table 1 – Chloride Ion Content of Concrete from test samples

Chloride salt concentration varies from a minimum of 0.03% to a maximum of 0.95% by w/cement. Some of the chloride ion contents are above the 0.4% threshold typically associated with the initiation of chloride induced corrosion [3] and would be expected to contribute to any corrosion attack on the steel. The averaged data in Table 2 indicates a relatively homogeneous chloride concentration on profiling the concrete. This suggests some low background level of chloride salts from the construction phase, but also that the enhanced levels of chloride salts observed are migrating through the surface concrete as a result of chloride de-icing salt usage on the pedestrian surfaces above.

| Sample depth/mm | Average Chloride Content (% by mass of cement) |
|-----------------|------------------------------------------------|
| 5-25 | 0.13 |
| 25-50 | 0.13 |
| 50-75 | 0.10 |

Table 2 – Chloride ion content average at each depth

Chloride ion contents appear to be higher in the more elevated (Soffits and Main Beams) southern sections of the structure, according to averaged data in Table 3. This coincides with the most damaged areas of the building and would suggest that chloride salt ingress is, not surprisingly, contributing to the corrosion problem observed. This analysis of the distribution of chloride salts on the structure, facilitates identification of areas most like to suffer chloride induced corrosion attack i.e. soffit and main beams.

| Sample depth/mm | Average Chloride Content (% by mass of cement) | | | | | |
|-----------------|------------------------------------------------|----------------|----------------|---------|------------|--------------|
| | Columns | Internal Walls | External Walls | Soffits | Main Beams | Garage Beams |
| 5-25 | 0.03 | 0.08 | 0.05 | 0.24 | 0.20 | 0.07 |
| 25-50 | 0.03 | 0.09 | 0.03 | 0.24 | 0.18 | 0.06 |
| 50-75 | 0.03 | 0.07 | 0.03 | 0.20 | 0.16 | 0.06 |

Table 3 – Summary of chloride data for each element at 3 depths

4.4 Concrete carbonation depth testing

Data from concrete carbonation testing is shown in Table 4.

The carbonation depth is variable over the structure. In some areas carbonation is minimal. However in other areas carbonation has reached the steel reinforcement and has led to corrosion initiation. This can be clearly observed on the external walls (see sample SU35) where the rebate formed in the centre of the wall for aesthetic effect has led to a reduction in concrete cover to the steel which in some areas is less than 15mm.

| Sample Reference | Carbonation Depth/mm |
|------------------|----------------------|
| SU1 | 5 |
| SU3 | 3 |
| SU8 | 30 |
| SU9 | 25 |

| | |
|------|----|
| SU10 | 28 |
| SU14 | 25 |
| SU15 | 2 |
| SU16 | 17 |
| SU17 | 12 |
| SU18 | 10 |
| SU19 | 8 |
| SU20 | 18 |
| SU21 | 27 |
| SU23 | 22 |
| SU24 | 18 |
| SU25 | 2 |
| SU26 | 0 |
| SU27 | 1 |
| SU28 | 2 |
| SU29 | 0 |
| SU30 | 12 |
| SU31 | 20 |
| SU32 | 5 |
| SU33 | 0 |
| SU35 | 17 |

Table 4 – Carbonation depth measurements

4.4 Hammer Tap & Visual Defects Survey

All elements of the structure were tested using the hammer tap technique. Some larger areas of defects were noted where localised contamination is suspected. Smaller defects have also all been recorded on the defects drawing shown in the Appendix A. In addition an area of fire damaged concrete was also included in the defects.

5.0 DISCUSSION OF TEST RESULTS

Visual inspection of the structure identified a number of locations where concrete spalling is occurring, both internally and externally. The defects are summarised in the survey in Appendix A which highlights some extensive areas of concrete spalling but also smaller very localised concrete delaminations.

Concrete chloride content is generally low and hence the relatively good condition of the structure with respect to corrosion damage. However, some areas exhibit chloride salt concentrations $>0.4\%$ threshold commonly associated with corrosion activity [4]. In one area of substantial corrosion damage, SU 21, the chloride concentration is $\sim 0.8\%$ and is thus likely to be the main cause of corrosion in this area. Other limited areas of higher chloride are associated

with the Southern Internal section of the car park on soffits and beams where leakage of salts have occurred through the damaged water-proofing on the footpaths above.

Concrete cover levels vary significantly. This is not unusual on a structure of this age and type. Most areas have good concrete cover of ~45mm which would normally offer significant protection against diffusion of aggressive agents such as chloride salts and carbonation.

However, significant areas have particularly low concrete cover and at these locations carbonation of the concrete cover has occurred leading to corrosion of the underlying reinforcement bar and concrete spalling damage. This is the main mechanism of corrosion on the external walls where regular small concrete spalls can be observed. These will continue to propagate if not repaired.

During the visual survey there was an area which was highlighted for repair as it appears to be visibly fire damaged and requires some attention.

6.0 SUGGESTED REFURBISHMENT OPTIONS

The data obtained from the testing identifies both chloride and carbonation induced corrosion, the latter in particular observed on the external surfaces. Any existing corrosion damage needs to be repaired to prevent rapid propagation of corrosion induced concrete spalling in those areas, with associated steel section loss.

Two refurbishment options are detailed below. Option A details works required to both repair existing damage using EN1504 compliant mortars and limit the propagation of future corrosion through the application of barrier coatings and the installation of sacrificial anodes which will corrode in preference to the steel reinforcement. Option B incorporates a protective and decorative coating system to the car park deck driving isles and parking bays. This is not considered urgent at this time as the deck appears to be in sound condition. However, if the car park is brought back in to use then the application of a deck coating is recommended as it will provide an effective barrier to moisture and chlorides brought in by vehicles – preventing deterioration of the deck and associated increased maintenance costs.

The cost shown under each option is the total estimated cost of maintenance over years 1 – 30 as detailed in Appendix B.

6.1 Internal and External Concrete Elements

6.1.1 Option A: Concrete repairs, corrosion control & coatings (excluding deck)

Concrete repairs to cracked and spalling concrete, identified in Appendix A, using EN1504 compliant materials, plus sealant replacement works.

Install 'PatchGuard' tied-on sacrificial anodes at the boundary of patch repairs to extend repair life by delaying the onset of corrosion, plus 'PatchGuard Connect' drilled-in sacrificial anodes to areas of the internal concrete structure currently sound but deemed to be at risk of corrosion damage.

Apply anti-carbonation coating to internal vertical and overhead concrete surfaces to limit carbonation of the concrete cover, reduce moisture ingress, and increase brightness and aesthetic appeal.

Apply hydrophobic silane cream to external concrete walls to limit moisture ingress and thereby slow the corrosion process. The silane cream is transparent and thus would not be subject to unsightly peeling and disbondment as a paint coating may be.

Estimated Cost of Works: £706,250 (over 30 year period)

6.1.2 Option B: As above plus deck coating to driving isles & line markings

Concrete repair, sealant, corrosion control and concrete coating works as per option A

Apply decorative and protective car park decking system to all car park driving isles and parking bays to protect the structure from aggressive agents and significantly improve the aesthetic appearance of the structure.

Estimated Cost of Works: £1,223,750 (over 30 year period)

(On behalf of Concrete Preservation Technologies Ltd.)

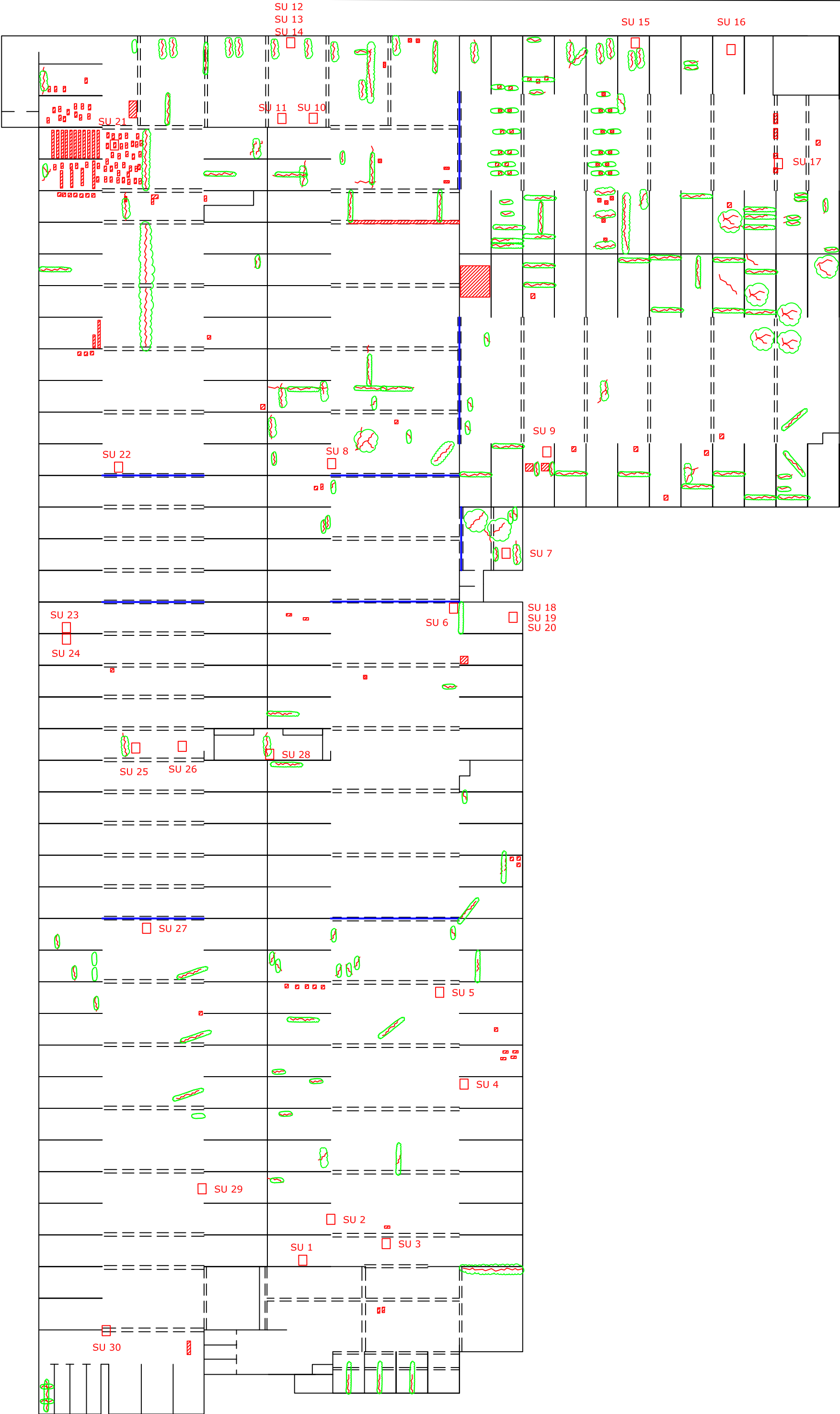
REFERENCES

1. British Standards Institution (2012) Cathodic Protection of Steel in Concrete BS EN 12696:2012, British Standards Institution.
2. Concrete Society Technical Report 60, 'Electrochemical tests for reinforcement corrosion'.
3. Broomfield, J. P. (1997) Corrosion of steel in concrete - Understanding, investigation and repair, London; E & FN SPON.
4. Building Research Establishment (2000), Corrosion of steel in concrete, BRE Digest 444, Building Research Establishment
5. EN 1504 (2005), 'Products and systems for the protection and repair of concrete structures - definitions, requirements, quality control and evaluation of conformity.'

| |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The information contained herein is to the best of our knowledge accurate and current and is given in good faith, but no liability can be assumed by the company for any damage, loss, injury or patent infringement arising from its use. The company cannot cover the conditions of use and application of its products and any warranty, written or implied covers material only.</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

APPENDIX A – Defects and Test Locations (Plan and External Elevations)

All defects and sample locations marked are approximate
Defect sizes may be enlarged for ease of viewing



SU 12
SU 13
SU 14

SU 15

SU 16

SU 11 SU 10

SU 17

SU 22

SU 8

SU 9

SU 7

SU 23

SU 24

SU 6

SU 18
SU 19
SU 20

SU 28

SU 25

SU 26

SU 27

SU 5

SU 4

SU 29

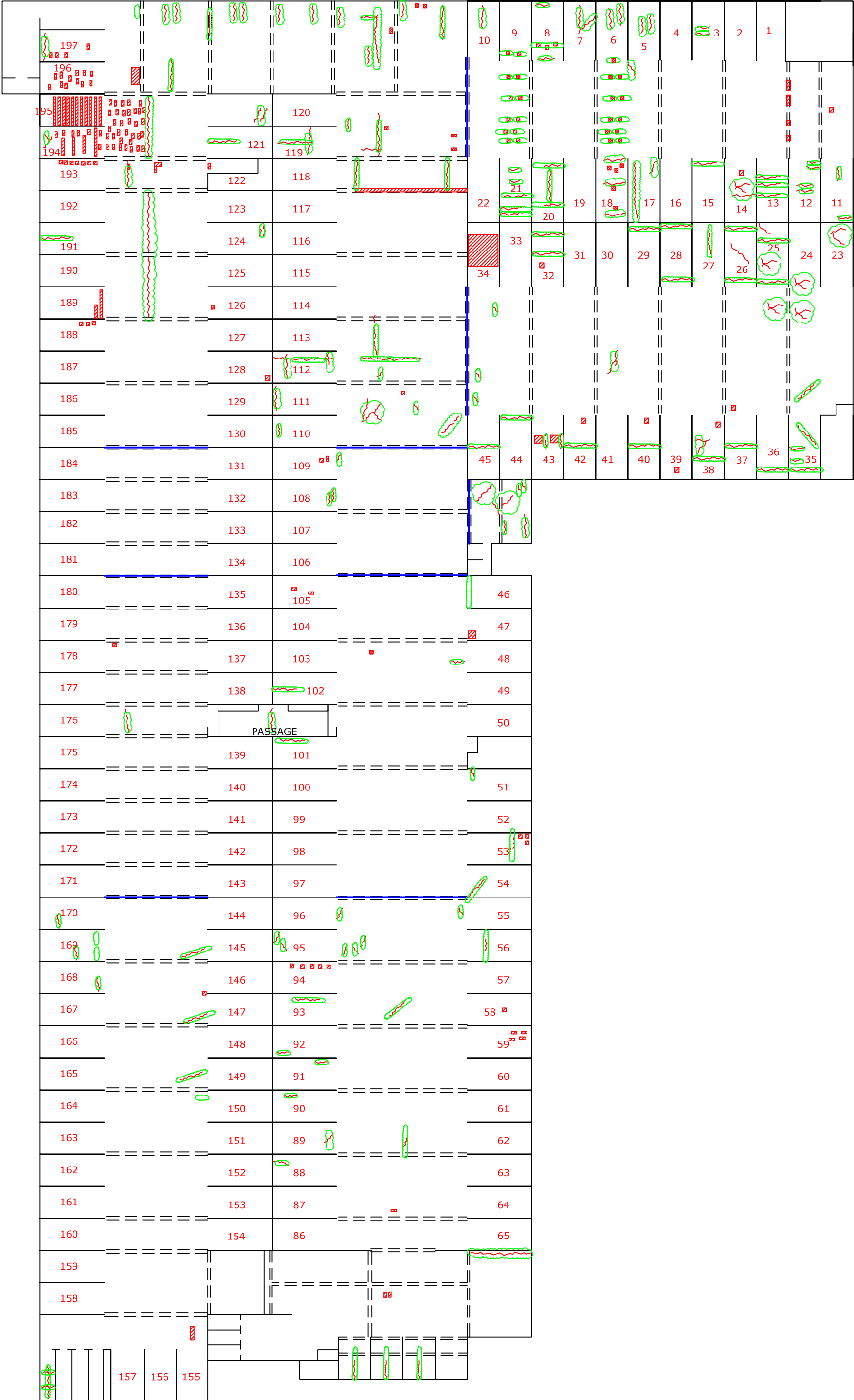
SU 2

SU 1

SU 3

SU 30

All defect and sample locations marked are approximate
Defect sizes may be enlarged for ease of reading



KEY: Drawing Title:

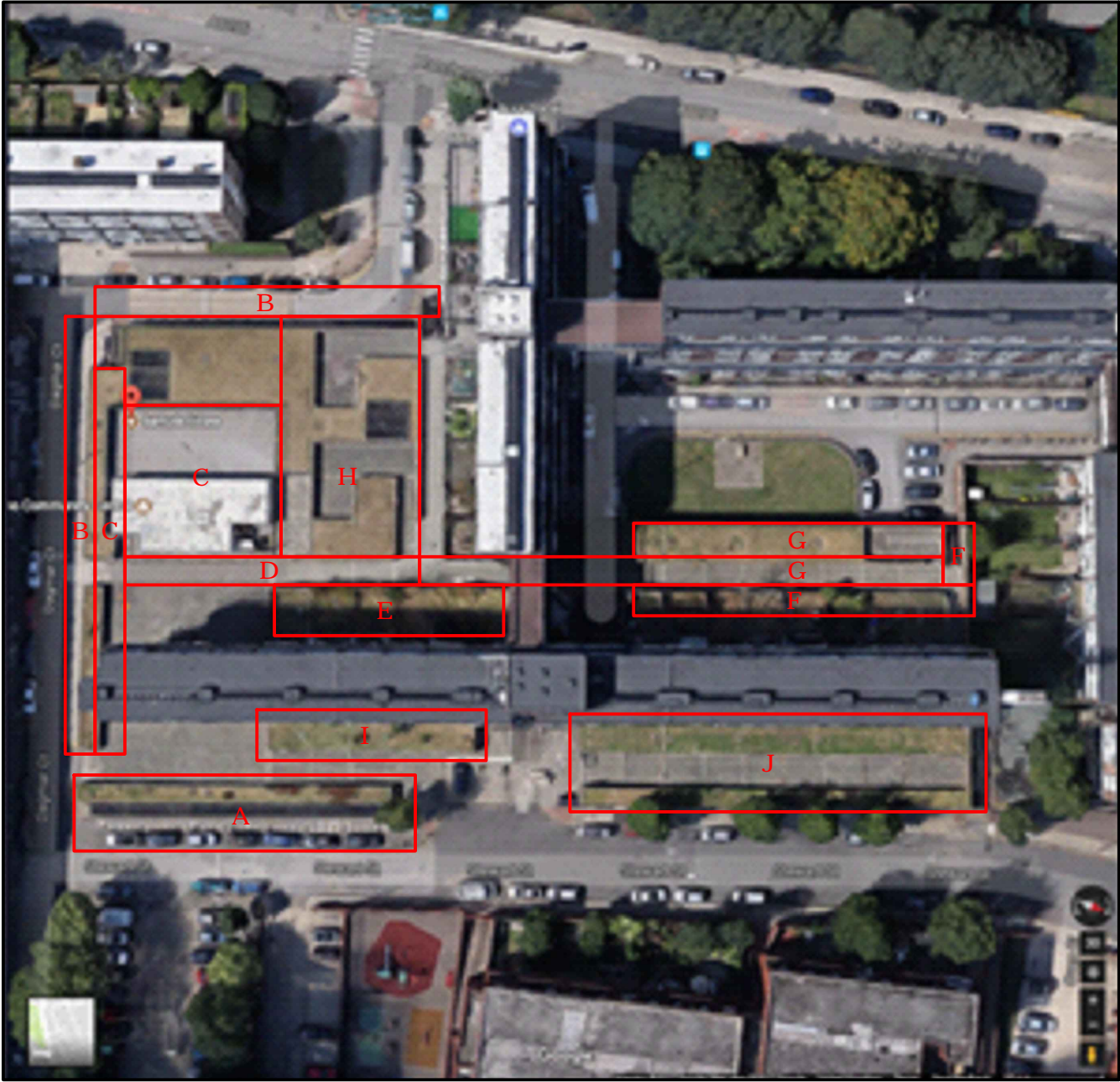
HCP test zone: xxx

Water Ingress:


Spalling Concrete:

Joint:

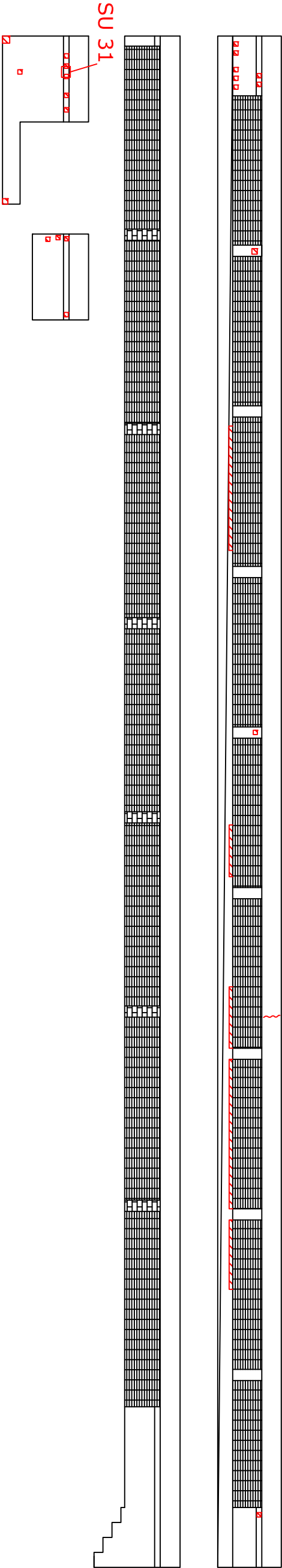
Samuda Estate,
Underground Carpark



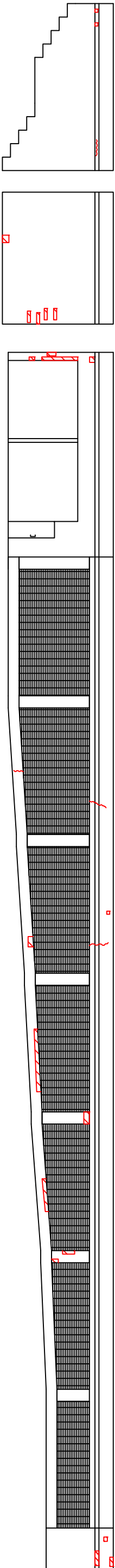
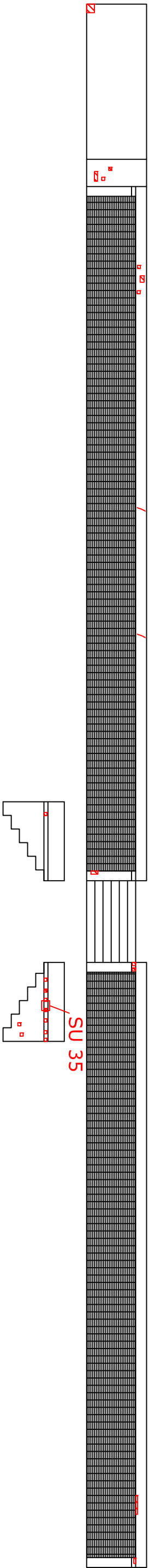
All defect and sample locations marked are approximate
Defect sizes may be enlarged for ease of reading

| | |
|------------------------------------------------------------------------------------------------------|---------------------------------|
| KEY: | Drawing Title: |
| Element Areas:  | Samuda Estate, Location Plan |

Part A



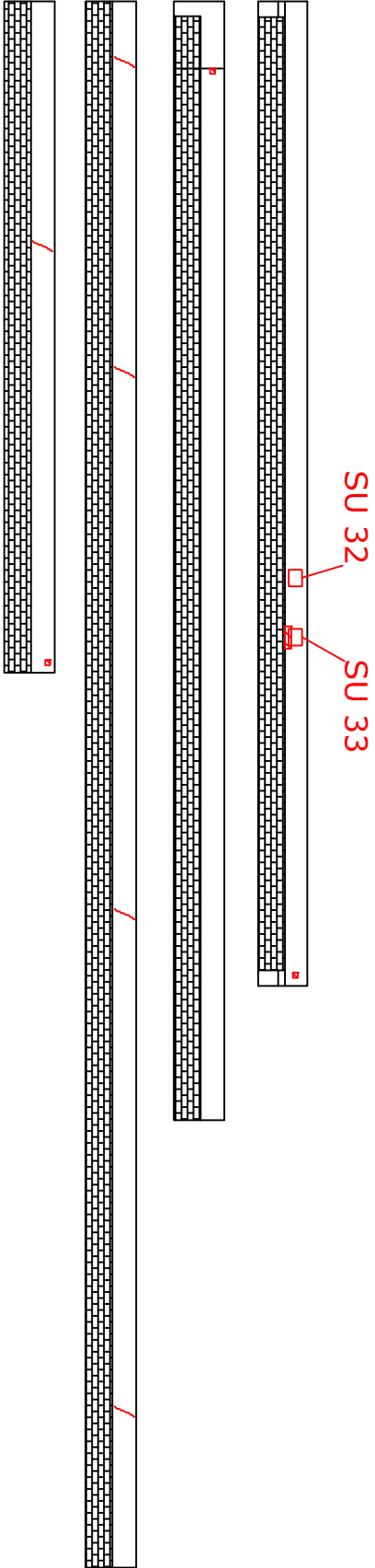
Part B



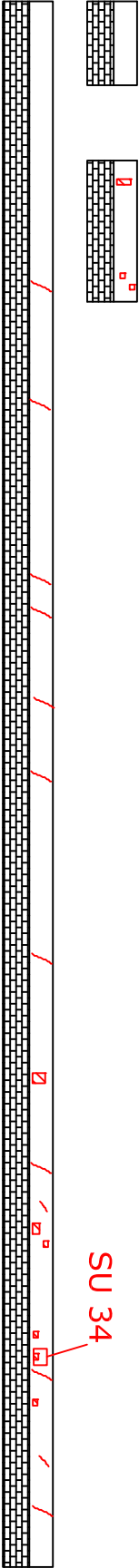
At defect and sample locations marked are approximate
Defect sizes may be enlarged for ease of reading

| KEY: | Drawing Title: |
|-----------------------------|---------------------------|
| CI sample name: SUxx | Samuda Estate, Part A & B |
| Spalling Concrete: | |
| Expansion Joint: | |
| Cracked Concrete: | |

Part C



Part D

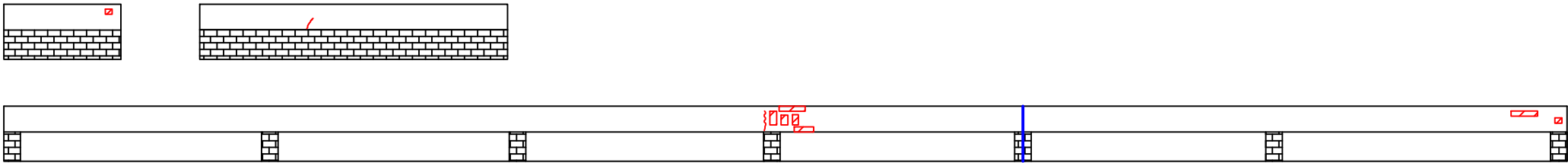


All defect and sample locations marked are approximate.
Object sizes may be enlarged for ease of viewing.

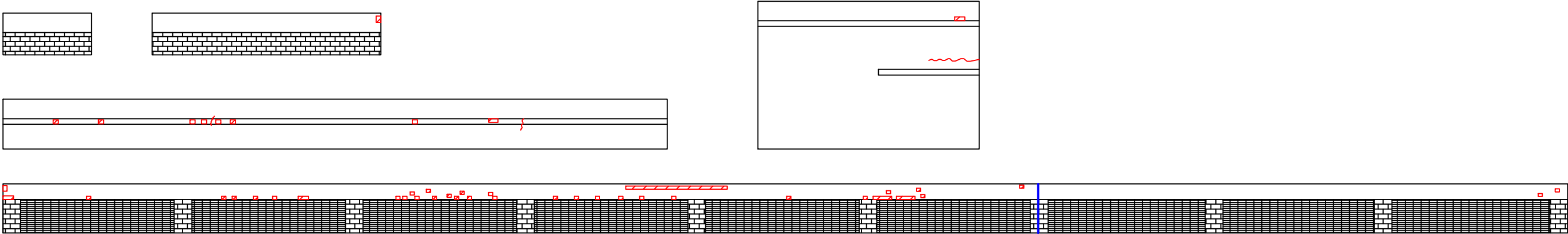
| | |
|------------------------------|----------------|
| KEY: | Drawing Title: |
| CI sample name: SUxxx | |
| Spalling Concrete: | |
| Expansion Joint: | |
| Cracked Concrete: | |

Samuda Estate, Part C & D




Part E



Part F

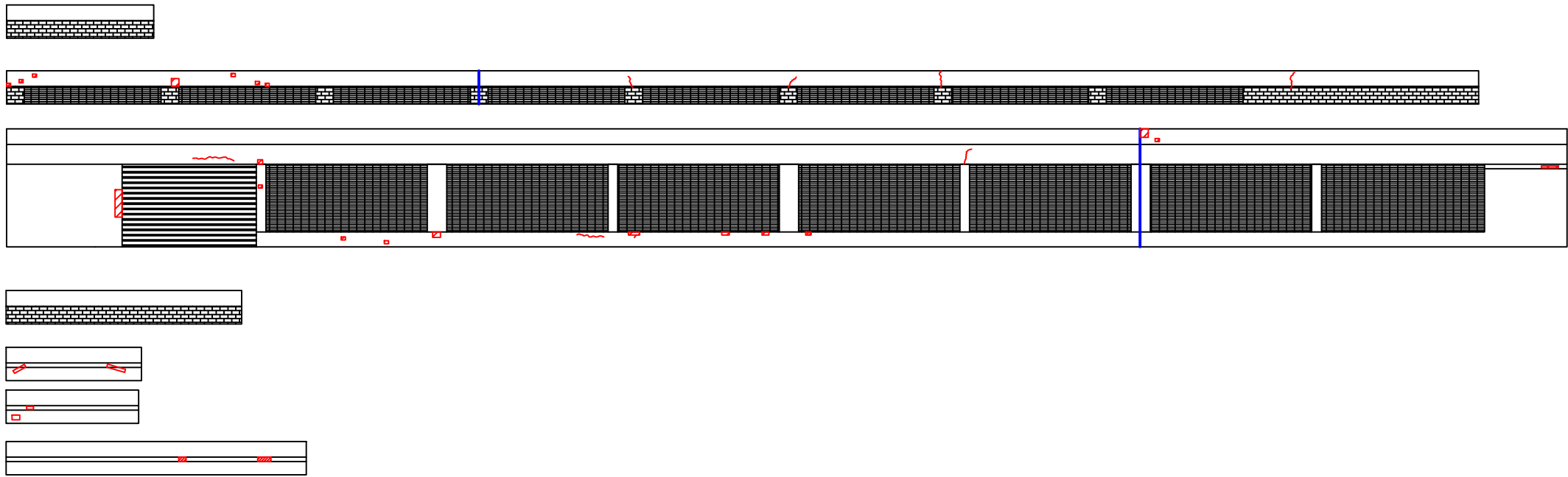


All defect and sample locations marked are approximate
Defect sizes may be enlarged for ease of reading

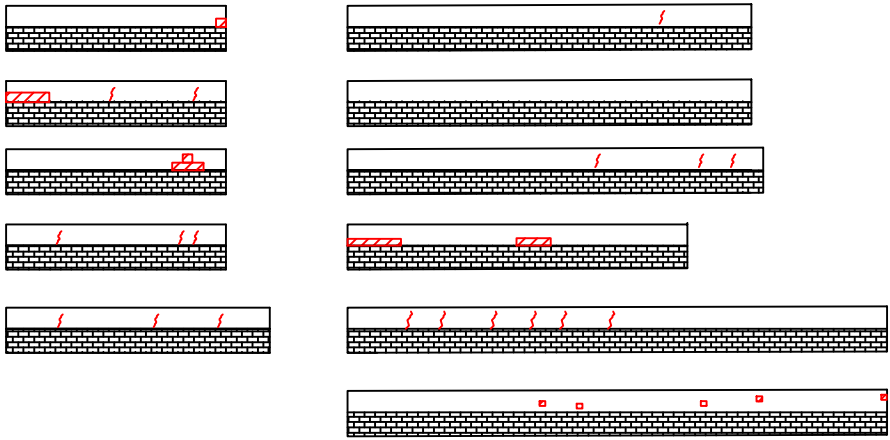
KEY:
Spalling Concrete: 
Expansion Joint: 
Cracked Concrete: 

Drawing Title:
Samuda Estate, Part E & F



Part G



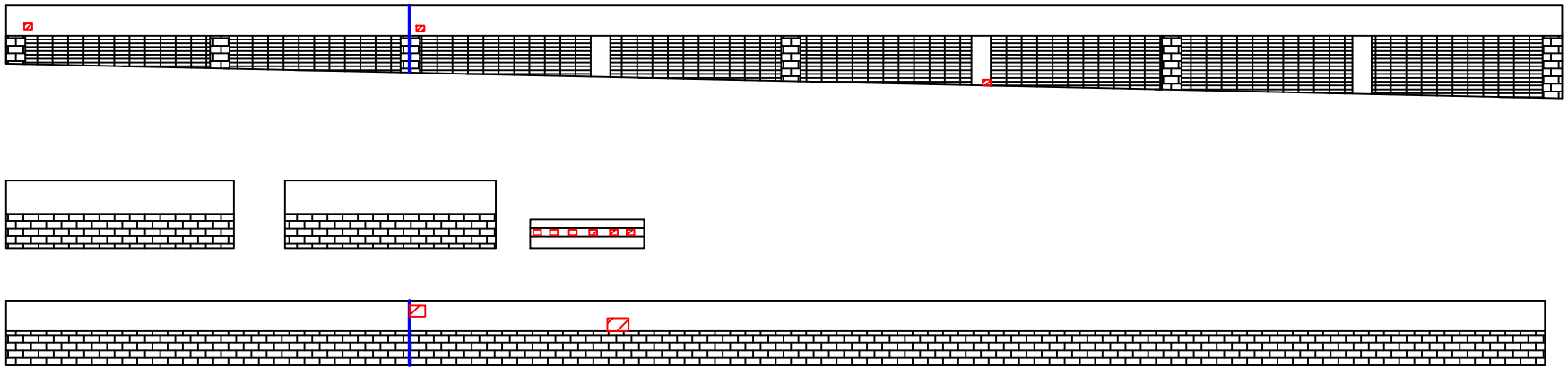
Part H



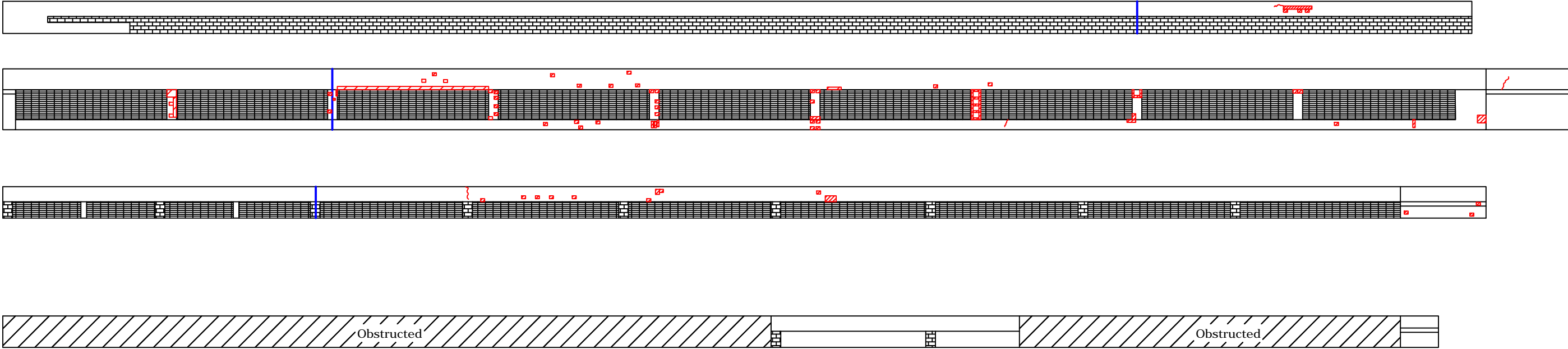
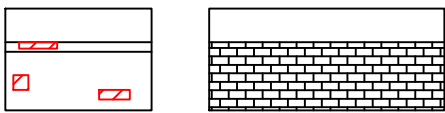
All defect and sample locations marked are approximate
Defect sizes may be enlarged for ease of reading

| | |
|----------------------------------------------------------------------------------------------------------|---------------------------|
| KEY: | Drawing Title: |
| Spalling Concrete:  | Samuda Estate, Part G & H |
| Expansion Joint: | |
| Cracked Concrete:  | |

Part I



Part J



All defect and sample locations marked are approximate
Defect sizes may be enlarged for ease of reading

| | |
|--------------------|---------------------------|
| KEY: | Drawing Title: |
| Spalling Concrete: | Samuda Estate, Part I & J |
| Expansion Joint: | |
| Cracked Concrete: | |

APPENDIX B – Estimated Life Time Cost Analysis

Intrusive Survey of Samuda Estate - Below Ground Car Park & Associated External Wall areas

Concrete Associated Areas Only (External & Internal)

Summary of Option Costs Years 1-30 Presented by Concrete Preservation Technologies Ltd (CPT)

| | | | | | | | | | | | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------------|-----------|---------------|----------------|------------------|
| | | | | | | | | | | | | | | | | |
| Repair and maintain existing concrete structural elements & apply protective coverings (external & internal) - excludes protective car park deck coatings and line markings | | | | | | | | | | | | | | | | |
| Option A - Essential Measures | | | | | | | | | | | | | | | | |
| Building Name | Component of Work (Report Clause 5.1.1) | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Yrs 11-15 | Yrs 16-20 | Yrs 21-25 | Yrs 26-30 | Yrs 1-30 |
| Samuda Estate Below Ground Car Park | On going Survey Assessment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,000 | 0 | 0 | 12,000 | 24,000 |
| Samuda Estate Below Ground Car Park | Internal Elements Repairs and Sealant Works | 67,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33,500 | 0 | 0 | 33,500 | 134,000 |
| Samuda Estate Below Ground Car Park | Internal Elements Sacrificial Anode Corrosion Control | 36,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18,000 | | | 18,000 | 72,000 |
| Samuda Estate Below Ground Car Park | Internal Elements Protective Paint Coatings | 68,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68,000 | 0 | 0 | 68,000 | 204,000 |
| Samuda Estate Below Ground Car Park | External Elements Repairs and Sealant Works | 40,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20,000 | | 20,000 | 0 | 80,000 |
| Samuda Estate Below Ground Car Park | External Elements Protective water repellent | 17,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,000 | 0 | 17,000 | 0 | 51,000 |
| | Option A Sub Total | 228,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 168,500 | 0 | 37,000 | 131,500 | 565,000 |
| | Preliminaries at 25% | 57,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 42,125 | 0 | 9,250 | 32,875 | 141,250 |
| | Option A Total | 285,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 210,625 | 0 | 46,250 | 164,375 | 706,250 |
| | | | | | | | | | | | | | | | | |
| As option A - But with protective floor coatings & clearly marked running Isles | | | | | | | | | | | | | | | | |
| Option B - Recommended to return Structural Concrete areas to serviceable In use Car Park | | | | | | | | | | | | | | | | |
| Building Name | Component of Work (Report Clause 5.1.2) | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Yrs 11-15 | Yrs 16-20 | Yrs 21-25 | Yrs 26-30 | Yrs 1-30 |
| Samuda Estate Below Ground Car Park | On going Survey Assessment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12,000 | 0 | 0 | 12,000 | 24,000 |
| Samuda Estate Below Ground Car Park | Internal Elements Repairs and Sealant Works | 67,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33,500 | 0 | 0 | 33,500 | 134,000 |
| Samuda Estate Below Ground Car Park | Internal Elements Sacrificial anode corrosion control | 36,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18,000 | | | 18,000 | 72,000 |
| Samuda Estate Below Ground Car Park | Internal Elements Protective Paint Coatings | 68,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68,000 | 0 | 0 | 68,000 | 204,000 |
| Samuda Estate Below Ground Car Park | Internal Elements Apply Running Isles Paint Protection | 65,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82,000 | 0 | 0 | 82,000 | 229,000 |
| Samuda Estate Below Ground Car Park | Internal Elements Apply Paint Protection to Parking Bays | 65,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60,000 | 0 | 0 | 60,000 | 185,000 |
| Samuda Estate Below Ground Car Park | External Elements Repairs and Sealant Works | 40,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20,000 | 0 | 20,000 | 0 | 80,000 |
| Samuda Estate Below Ground Car Park | External Elements Protective water repellent | 17,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,000 | 0 | 17,000 | 0 | 51,000 |
| | Option B Sub Total | 358,000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 310,500 | 0 | 37,000 | 273,500 | 979,000 |
| | Preliminaries at 25% | 89,500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 77,625 | 0 | 9,250 | 68,375 | 244,750 |
| | Option B Total | 447,500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 388,125 | 0 | 46,250 | 341,875 | 1,223,750 |

APPENDIX C – Provisional Bill of Quantities for Concrete Repairs and Coatings Protection

| Provisional Bill of Quantities for Concrete Repairs | | Qty | Unit | Rate £ | Totals £ |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|--------|----------|
| 1 | Preliminary Items | | | | |
| 1a | Supervision and Management | | wks | | |
| 1b | Transport and Plant | | wks | | |
| 1c | Protection | | Item | | |
| 1d | Scaffolding and Access | | Item | | |
| 1e | Site Accommodation and Welfare | | Item | | |
| 2 | Inspection - Hammer Test | | | | |
| | Review existing information and inspect all concrete surfaces to confirm the full nature and extent of repairs. Clearly mark the extent of concrete cover, or failed repair material, to be removed and make adequate arrangements for propping if required. | | Item | | |
| 3 | Half Cell Potential Testing | | | | |
| | Undertake half cell potential testing on a 500mm grid to areas of suspected corrosion risk in accordance with ASTM C876 and mark up areas identified as requiring corrosion protection (ref. Item 8). | 200 | m2 | | |
| 4 | Clean Existing Concrete Surfaces | | | | |
| | Clean all existing exposed concrete surfaces via the use of high pressure water jetting to remove existing contaminants and expose latent defects | 13,500 | m2 | | |
| 5 | Repairs Schedule | | | | |
| | Concrete repair rates are deemed to include for the use of BS EN1504 R4 spray applied or R3 hand placed repair systems for the repair of concrete surfaces, and the matching of existing profiles, with breakout, preparation and application as per the manufacturer's specification. | | | | |
| 5a | 25-50mm Depth | | | | |
| i. | Surfaces 0.00 - 0.01 m2 | 10 | Each | | |
| ii. | Surfaces 0.01 - 0.05 m2 | 20 | Each | | |
| iii. | Surfaces 0.05 - 0.10 m2 | 18 | Each | | |
| iv. | Surfaces 0.10 - 0.25 m2 | 20 | Each | | |
| v. | Surfaces 0.25 - 0.50 m2 | 2 | Each | | |
| vi. | Surfaces 0.50 - plus m2 | | m2 | | |
| 5b | 50 mm - 75 mm Depth | | | | |
| i. | Surfaces 0.00 - 0.01 m2 | 8 | Each | | |
| ii. | Surfaces 0.01 - 0.05 m2 | 15 | Each | | |
| iii. | Surfaces 0.05 - 0.10 m2 | 25 | Each | | |
| iv. | Surfaces 0.10 - 0.25 m2 | 8 | Each | | |
| v. | Surfaces 0.25 - 0.50 m2 | 2 | Each | | |
| vi. | Surfaces 0.50 - plus m2 | 17.5 | m2 | | |
| 5c | 75 mm - 100 mm Depth | | | | |
| i. | Surfaces 0.00 - 0.01 m2 | | Each | | |
| ii. | Surfaces 0.01 - 0.05 m2 | 3 | Each | | |
| iii. | Surfaces 0.05 - 0.10 m2 | 10 | Each | | |
| iv. | Surfaces 0.10 - 0.25 m2 | 15 | Each | | |
| v. | Surfaces 0.25 - 0.50 m2 | 10 | Each | | |
| vi. | Surfaces 0.50 - plus m2 | 55.5 | m2 | | |
| | | | | c/f | |

| Provisional Bill of Quantities for Concrete Repairs | | Qty | Unit | Rate £ | Totals £ |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------------|----------|
| 6 | Repair of Cracked Concrete Surfaces Grind out cracked surface, removing all loose concrete, and repair using a suitable BS EN1504 R3 concrete repair system to match existing surface finishes and profiles, with breakout, preparation and application as per the manufacturer's specification. | 350 | lm | b/f | |
| 7 | Galvanic Anodes to Patch Repairs Install PatchGaurd Plus galvanic anodes into drilled holes at 400mm centres at the perimeter of all concrete repairs (ref. Item 5) with preparation and installation as per the manufacturer's specification. | 800 | No. | | |
| 8 | Galvanic Anodes to Areas of Corrosion Risk Install PatchGuard Plus Connect anode system into drilled holes at 400mm centres to areas of corrosion risk (ref. Item 3) with preparation and installation as per the manufacturer's specification. | 500 | No. | | |
| 9 | Apply Anti Carbonation Coating Prepare concrete surfaces and apply two coats of water based acrylic copolymer anti-carbonation coating conforming to BS EN1504-2 to all concrete surfaces, with preparation and application as per the manufacturer's specification. | | | | |
| i. | Surfaces 0.00 - 150 mm wide | 300 | lm | | |
| ii. | Surfaces 150 - 300 mm wide | 1,100 | lm | | |
| iii. | Surfaces over 300 mm wide | 8,100 | m2 | | |
| 10 | Replace Existing Mastic to Expansion Joints Prepare and clean existing joints, install suitable backing rod and apply new 2 part polysulphide sealant as per the manufacturer's specification. | 150 | lm | | |
| 11 | Hard Wearing Deck Membrane to Driving Isles Apply Pitchmastic PmB 'Deck Protect' inter-deck car park decking system to driving isles, with substrate preparation and application as per the manufacturer's specification. | 2,500 | m2 | | |
| | | | | Total | |

| Provisional Bill of Quantities for Concrete Repairs | | Qty | Unit | Rate £ | Totals £ |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------|----------|
| 1 | Preliminary Items | | | | |
| 1a | Supervision and Management | | wks | | |
| 1b | Transport and Plant | | wks | | |
| 1c | Protection | | Item | | |
| 1d | Scaffolding and Access | | Item | | |
| 1e | Site Accommodation and Welfare | | Item | | |
| 2 | Inspection - Hammer Test Review existing information and inspect all concrete surfaces to confirm the full nature and extent of repairs. Clearly mark the extent of concrete cover, or failed repair material, to be removed and make adequate arrangements for propping if required. | | Item | | |
| 3 | Clean Existing Concrete Surfaces Clean all existing exposed concrete surfaces via the use of high pressure water jetting to remove existing contaminants and expose latent defects. | 2,850 | m2 | | |
| 4 | Repairs Schedule Concrete repair rates are deemed to include for the use of hand placed repair systems for the repair of concrete surfaces, and the matching of existing surface finishes and profiles, using a suitable BS EN1504 R3 repair system, with breakout, preparation and application as per the manufacturer's specification. | | | | |
| 4a | 25-50mm Depth | | | | |
| i. | Surfaces 0.00 - 0.01 m2 | 20 | Each | | |
| ii. | Surfaces 0.01 - 0.05 m2 | 100 | Each | | |
| iii. | Surfaces 0.05 - 0.10 m2 | 28 | Each | | |
| iv. | Surfaces 0.10 - 0.25 m2 | 8 | Each | | |
| v. | Surfaces 0.25 - 0.50 m2 | 8 | Each | | |
| vi. | Surfaces 0.50 - plus m2 | | m2 | | |
| 4b | 50 mm - 75 mm Depth | | | | |
| i. | Surfaces 0.00 - 0.01 m2 | | Each | | |
| ii. | Surfaces 0.01 - 0.05 m2 | 28 | Each | | |
| iii. | Surfaces 0.05 - 0.10 m2 | 52 | Each | | |
| iv. | Surfaces 0.10 - 0.25 m2 | 20 | Each | | |
| v. | Surfaces 0.25 - 0.50 m2 | 10 | Each | | |
| vi. | Surfaces 0.50 - plus m2 | 2 | m2 | | |
| 4c | 75 mm - 100 mm Depth | | | | |
| i. | Surfaces 0.00 - 0.01 m2 | | Each | | |
| ii. | Surfaces 0.01 - 0.05 m2 | 3 | Each | | |
| iii. | Surfaces 0.05 - 0.10 m2 | 3 | Each | | |
| iv. | Surfaces 0.10 - 0.25 m2 | 2 | Each | | |
| v. | Surfaces 0.25 - 0.50 m2 | 1 | Each | | |
| vi. | Surfaces 0.50 - plus m2 | | m2 | | |
| | | | | c/f | |

| Provisional Bill of Quantities for Concrete Repairs | | Qty | Unit | Rate £ | Totals £ |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------|--------------|----------|
| 5 | Repair of Cracked Concrete Surfaces Grind out cracked surface, removing all loose concrete, and repair using a suitable BS EN1504 R3 concrete repair system to match existing substrate finishes and profiles, with breakout, preparation and application as per the manufacturer's specification. | 100 | lm | b/f | |
| 6 | Application of BS EN1504 Class R4 Levelling Mortar to Panel Recess Apply protective cementitious levelling mortar to 2mm thickness to all recessed sections of the exposed aggregate panels with substrate preparation and material application as per the manufacturer's specification. Surfaces 0.00 - 150 mm wide Surfaces 150 - 300 mm wide Surfaces over 300 mm wide | 110 | lm lm m2 | | |
| 7 | Apply Thixotropic Silane Cream Apply WRP7 thixotropic silane cream to all concrete surfaces with substrate preparation and material application as per the manufacturer's specification. | | | | |
| i. | Surfaces 0.00 - 150 mm wide | 500 | lm | | |
| ii. | Surfaces 150 - 300 mm wide | 1,200 | lm | | |
| iii. | Surfaces over 300 mm wide | 900 | m2 | | |
| 8 | Replace Existing Mastic to Expansion Joints Prepare and clean existing joints, install suitable backing rod and apply new 2 part polysulphide sealant as per the manufacturer's specification. | 150 | lm | | |
| | | | | Total | |

APPENDIX D – Product Data Sheets

Deck Protect⁺ Blueshield

Full Protective Car Park Deck Waterproof and Wear Course System

Description

Deck Protect⁺ is a comprehensive range of cold liquid applied Car Park waterproofing and surfacing systems utilising advanced polymeric technology.

Deck Protect⁺ Blueshield is specifically designed to provide robust waterproof protection to car park top decks, exposed decks, ramps and entrances as well as intermediate decks where shop premises or habitable space lie beneath.

The system provides an elastomeric, crack bridging, tough seamless waterproof protection. It consists of a substrate Epoxy/Pu Pre conditioning coat, Spray Applied Pu Membrane, Body coat and UV stable hard wearing Pu Top coat which gives a highly attractive aesthetic finish, superior elastomeric waterproofing with robust chemical and skid resistance.

Fields of Application

Asphalt/Concrete Exposed decks, Intermediate decks over Shop Premises and Ramps where waterproof integrity is essential.

Features and Benefits

- Applied by Manufacturers Authorised Contractors only
- UV stable
- Dynamic elongation and crack bridging ability
- No scrim required
- Cold applied, no hot works
- Fully bonded, self-terminating system
- Easy application to complicated details
- Resistant to fuels, battery acid, de-icing salts, alkaline cleaners.
- Self-terminating system - no tucks required
- Excellent traffic wear and skid resistance
- Water vapour permeability
- Fast to apply
- Extremely robust system
- Weatherproof
- Superior bond, shear and peel strengths to concrete when compared to MMA systems
- Low odour
- Low dirt retention making it easy to clean and maintain
- Attractive appearance with excellent colour continuity

Technical Data

Application Temperature

2 – 30°C

System thickness and weight (typical)

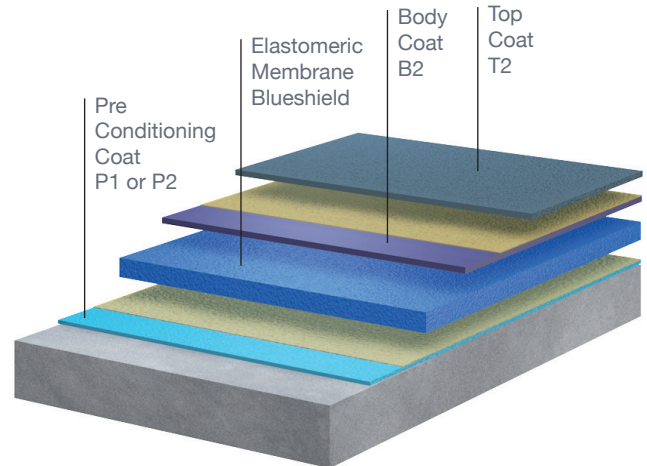
3mm to 4mm = 3.5 to 5kg m²

Skid resistance value SRV

Pendulum test 45-60 dependant on substrate profile

Chemical resistance

No effects observed against:- De-icing salts, Petrol/Diesel, Motor oils, Brake fluids, Hydraulic fluids, Anti-freeze.



Substrate Preparation

Prior to application the substrate must be clean and dry with substrate free from dust, laitance, dirt, oil, grease and other contaminants. This is best achieved by mechanical preparation (captive shot blasting, floor plane or diamond grinder).

On Mastic Asphalt decks the repair of day joints, solar shock and secondary compaction should be assessed and undertaken prior to application.

New concrete decks should be a minimum of 14 days old and must be laitance free, clean dry and structurally sound.

All substrates should have tensile adhesion tests carried out to ensure suitable bond can be achieved.

Application

Pre conditioning Coat

Concrete: Apply **Deck Protect P1** preconditioning coat or

Asphalt: Apply **Deck Protect P2** preconditioning coat. Then evenly distribute kiln dried silica sand (0.2-0.7mm) into the wet resin to rejection to provide a mechanical key

Elastomeric membrane

Apply **Deck Protect Blueshield** spray applied membrane using specialist plural component equipment. Evenly apply to all surfaces to provide a seamless coating at coverage rate of 1.5kg/m²

Body Coat

Apply **Deck Protect B2** Body coat evenly to the membrane. Broadcast kiln dried quartz aggregate (0.7-1.2mm) until rejection into the wet body coat to provide an anti-skid finish. Allow to cure.

Top Coat

Apply **Deck Protect T2** encapsulating coat to the aggregated surface. A range of contrasting colours are available for delineation of parking bays, running aisles and walkways. Allow to cure.

See individual Technical Data Sheets for specific mixing/application instructions and coverage rates.

Disclaimer:

The information presented within this document is accurate to the best of our knowledge. We reserve the right to change any of the details herein without notice. The information given should not be taken in any way as a specification. All technical properties quoted are from laboratory prepared samples. We will not accept liability or legal responsibility whatsoever arising out of the use of the information contained herein. This document does not constitute design information or opinion.

KEY:- EP= Epoxy based technology/ Pu= Polyurethane based technology/ MMA= Methyl methacrylate based technology/ C =suitable for Concrete/ A=suitable for Asphalt

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Fosroc® Dekguard W

constructive solutions

High performance water-based acrylic copolymer protective and decorative coating for concrete and masonry conforming to the requirements of BS EN1504-2

Uses

To protect atmospherically exposed reinforced concrete structures, cementitious substrates and masonry from aggressive elements, weathering and rain.

Dekguard W is suitable for use on all types of structures, including those in coastal environments. It is equally suitable for new and existing structures.

Dekguard W is a component of Fosroc's Renderoc system of concrete reinstatement.

Dekguard W is suitable for principles 1.3, 2.2 and 8.2 as defined by BS EN 1504-2

Advantages

- Excellent barrier to carbon dioxide, chloride ions, oxygen and water
- Allows water vapour to escape from the structure
- High resistance to the effects of long-term weathering and durable in all climatic conditions
- Water-based
- Wide range of decorative colours

Description

The Dekguard W system comprises a single component, penetrating silane-siloxane primer and a single component pigmented coating, both ready for immediate site use.

A range of reactive primers are available to suit substrate porosity and site conditions and inhibit the passage of water and waterborne contaminants.

Specification clauses

Protective/decorative surface coating

The protective coating shall comprise a penetrating silane-siloxane primer and Dekguard W, a single component aliphatic acrylic coating conforming to the requirements of BS EN 1504-2 principles 1.3, 2.2 and 8.2.

The total dry film thickness of the coating shall be not less than 150 microns and shall be capable of providing carbon dioxide diffusion resistance equivalent to not less than 130 metres of air.

It shall provide a reduction in chloride ion penetration not less than 84% (by the Aston University Diffusion Cell method) and no chloride ion diffusion after 600 days (by the Taywood method). It must exhibit a water vapour transmission resistance (Sd) of not more than 0.9 metres.

When tested to BS 476, Pt 7 : 1987, it must exhibit a Class 1 spread of flame and achieve a Class 0 Building Regulations Rating when tested to BS 476, Pt 6 : 1989 and Pt 7 : 1987.

Standards compliance

Dekguard W complies with the requirements of BS EN 1504-2 Principles 1.3, 2.2 and 8.2.

Fire tested to BS 476 Pt 6 1989 Fire propagation-Propagation index I : 0. Sub index i₁ : 0.

Fire tested to BS 476, Pt 7: 1987. Spread of flame - Class 1.

Building Regulations Rating-Class 0.

Fire rating EN 13501-1 2007 Euroclass B.

| | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| <p style="text-align: center;">CE 370</p> | |
| <p style="text-align: center;">Fosroc Ltd Drayton Manor Business Park, Coleshill Road, Tamworth, B78 3TL, UK 09 DOP: UK 9-02 0370-CPR-0865</p> | |
| <p style="text-align: center;">Dekguard W</p> | |
| <p style="text-align: center;">EN1504-2: Surface protection systems methods 1.3, 2.2 and 8.2</p> | |
| Permeability to CO ₂ | > 50 m |
| Permeability to water vapour | Class 1: < 5 m |
| Capillary absorption and permeability to water | < 0.1 kg/(m ² h ^{0.5}) |
| Adhesion strength by pull-off test | ≥ 2.0 MPa (trafficked) |
| Fire Classification | Class B |
| Dangerous substances | Complies with 5.3 |

Fosroc® Dekguard W

Properties

The following results were obtained at a temperature of 20°C unless otherwise stated.

| Test method | Standard | EN1504-2 Requirement | Result |
|--------------------------------------------------------------------|----------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Bond strength by pull off | EN 1542:2000 | Non traffic weight >1.0 MPa | 3.32 MPa |
| Water vapour permeability | EN ISO 7783-2:1999 | Class 1 Sd < 5 metres | 0.84 metres |
| Liquid water transmission rate | EN 1062-3:1999 | $W < 0.1 \text{ kg}/(\text{m}^2 \text{ h}^{0.5})$ | $< 0.04 \text{ kg}/(\text{m}^2 \text{ h}^{0.5})$ |
| Carbon dioxide permeability | EN 1062-6:2002 | Sd > 50 m | 133 metres |
| Surface drying Ballotini method | EN ISO 1517:1996 | - | 2 h 15 m |
| Equivalent thickness of 30MPa concrete cover | Taywood Method | - | 279 mm |
| Carbon dioxide permeability after 2000 hours QUV | Taywood Method | - | 91 m |
| Reduction in chloride ion penetration when Dekguard Primer is used | Aston University diffusion cell method | - | > 84% |
| Fire testing: Fire propagation | BS 476 Pt6: 1989 | - | Fire propagation index I:0 Sub index I _f :0 |
| Fire testing: Surface spread of Flame | BS 476 Pt 7:1987 | - | Class 1 |
| Fire Testing EN 13501-1 2007 | Methods EN-ISO 11925-2 and EN 13823 | - | Euroclass B S1 d0 |
| Number of coats | - | - | Dekguard Primer : Flood coat Dekguard W: 2 coats |
| Theoretical application rate per coat | - | - | Dekguard Primer: 0.4 litres / m ² Dekguard W: 0.18 litres / m ² |
| Theoretical wet film thickness per coat | - | - | Dekguard Primer : n/a Dekguard W : 180 microns |
| Volume Solids | | | 41% |
| Overcoating time @ 20°C | - | - | Dekguard Primer: 12 hours Dekguard W: 6 hours |
| Minimum application temperature | - | - | Application should not commence / be carried out at temperatures below 2°C. Cure times will be increased at low temperatures. |
| Colour range | - | - | Standard colours BS4800: White BS 00E55 Magnolia BS 08B15 Sandstone BS 08B17 Portland BS 00A01 Other colours to special order |

Clarification of property values: The typical properties given above are derived from laboratory testing. Results derived from field applied samples may vary.



Fosroc® Dekguard W

Application instructions

All coating work to be carried out in accordance with the relevant sections of BS6150:2006, Painting of Buildings - Code of Practice.

Preparation

All surfaces should be dry and free from contamination such as oil, grease, loose particles, decayed matter, moss, algal growth, laitance and all traces of mould release oils and curing compounds. This is best achieved by lightly grit-blasting the surface. Where moss, algae or similar growths have occurred, treatment with a proprietary biocide should be carried out after the grit-blasting process.

If Nitobond AR has been used as a curing membrane over Renderoc patch repairs, it is not necessary to remove this prior to the application of Dekguard W.

Where application over existing sound coatings is required, trials should be conducted to ensure compatibility and retention of the bond between the underlying coating and the substrate. For further advice, consult the local Fosroc office.

It is essential to produce an unbroken coating of Dekguard W. To ensure this is achieved, surfaces containing blow-holes or similar areas of pitting should first be filled using Renderoc FC, a cementitious fairing coat. Rougher substrates can be levelled using Renderoc RP252, a cementitious reprofiling and protection mortar. Separate data sheets must be referred to before commencing overcoating of Renderoc RP252 with Dekguard W.

Application

In order to obtain the protective properties of the Dekguard W system, it is important that the correct rates of application and overcoating times are observed.

Where more than one batch of material is to be used, restrict use of batch to whole separate elevations. Contact local Fosroc Office for further details.

Any areas of glass and window frames should be masked. Plants, grass, joint sealants, asphalt and bitumen-painted areas should be protected during application.

The Dekguard Primer should be applied in one or more coats until the recommended application rate of 0.4 litre per square metre has been achieved. This is best accomplished by using portable spray equipment of the knapsack-type.

Porous surfaces may require the application of Nitoprime DG as an alternative primer, or may require other special treatment. Nitoprime DG should be applied at the same coverage rate as Dekguard Primer but in continuous, multiple coats as necessary. If in doubt about the condition of the substrate consult Fosroc Technical Services.

All primed substrates should be treated with two coats of Dekguard W. Stir material before use. Application may be by brush, roller or airless spray. The first coat should be applied to achieve a uniform coating with a wet film thickness not less than 180 microns. This coat should be allowed to dry until firm to the touch. Typically, this will be after 16 hours in dry weather at 20°C.

The second coat of Dekguard W should be applied as detailed above, again achieving a wet film thickness not less than 180 microns and a total dry film thickness not less than 150 microns.

Semi protected surfaces

For semi-protected surfaces, such as multi storey car park interiors, a reduced specification may be adopted whilst still achieving a carbon dioxide diffusion resistance of > 50m of air.

Omit Dekguard Primer and apply two coats of Dekguard W at a wet film thickness of 140 microns per coat, diluting the first coat with 10% v/v water, to achieve a total dry film thickness of not less than 110 microns.

Cleaning

Dekguard W should be removed from tools and equipment with clean water immediately after use.

Limitations

When applied over existing coatings or paints, the performance characteristics of Dekguard W may be impaired and its fire rating invalidated. For further advice, consult the local Fosroc office.

The application of the primer should not commence if the temperature of the substrate is below 2°C. Application of Dekguard W should not commence if the temperature of the substrate is below 5°C, or less than 3°C above the dew point.

Dekguard W should not be applied where there is a likelihood of exposure to frost within 48 hours of the application. The product should not be applied in windy conditions where early-age dust adhesion may occur, or where rain is likely within 2 hours at 20°C or 20 hours at 5°C (up to 80% RH) or when the prevailing relative humidity exceeds 90%.

Dekguard W should not be considered for areas subjected to exposure to ponded water. Dekguard S should be considered where occasional ponded water is anticipated.

The manufacture of Dekguard coatings is a batch process and despite close manufacturing tolerances variation may occur between batches. Fosroc recommends using material from one batch only as the finish topcoat.

Fosroc® Dekguard W

Estimating

Supply

| | |
|------------------|----------------|
| Dekguard W: | 10 litre drums |
| Dekguard Primer: | 25 litre drums |
| Nitoprime DG: | 25 litre drums |

Coverage

| | |
|------------------|---------------------------------------|
| Dekguard W: | 5.5 m ² per litre per coat |
| Dekguard Primer: | 2.5 m ² per litre |
| Nitoprime DG: | 2.5 m ² per litre |

The coverage figures given are theoretical — due to wastage factors and the variety and nature of possible substrates, practical coverage figures will be reduced.

Storage

Store in cool, dry conditions, away from sources of heat and naked flames, in the original, unopened packs. Dekguard W should be protected from frost.

All products have a shelf life of 12 months if kept in a dry store in the original, unopened packs. Material from different batches should be stored separately.

If stored at high temperatures and/or high humidity conditions the shelf life may be reduced.

Precautions

Health and safety

For further information refer to appropriate Product Safety Data Sheet available at www.fosroc.com

Fire

Dekguard W is non-flammable.

Dekguard Primer and Nitoprime DG are flammable. Keep away from sources of ignition. No Smoking. In the event of fire, extinguish with CO₂ or foam. Do not use a water jet.

Flash points

| | |
|------------------|------|
| Dekguard Primer: | 38°C |
| Nitoprime DG: | 38°C |

For further information, refer to the Product Safety Data Sheet.

Fosroc and Dekguard are trademarks of Fosroc International Limited.



Fosroc Limited

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Important note

Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard Conditions for the Supply of Goods and Services, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification of information it may give is accurate and correct, it cannot, because it has no direct or continuous control over where or how its products are applied, accept any liability either directly or indirectly arising from the use of its products, whether or not in accordance with any advice, specification, recommendation of information given by it.

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Certificate number FM 610

PatchGuard™ Connect

Technical Datasheet



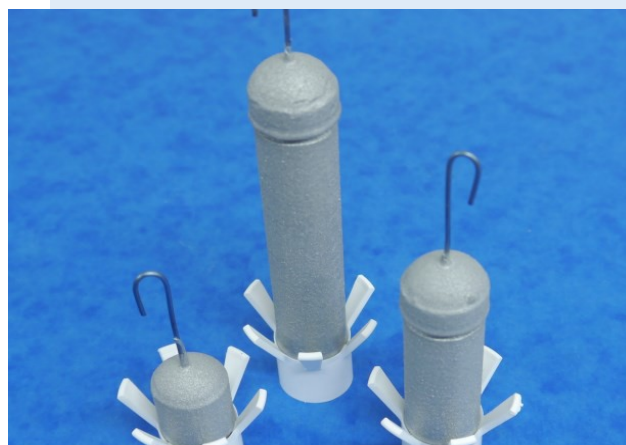
Description

PatchGuard Connect is a discrete sacrificial anode applied to reinforced concrete structures which are corroding as a result of chloride ingress or concrete carbonation.

PatchGuard Connect anodes provide a protective current to the reinforcing steel as a result of the sacrificial activity of the PatchGuard anode. Once installed, the PatchGuard Connect anode will corrode preferentially to the surrounding steel, offering protection against corrosion damage. Areas of sound concrete that are suffering from corrosion and from chloride contamination can be protected with a minimal amount of connections to the steel reinforcing—typically 2/3 per string of up to 50 anodes.

Features and Advantages

- Simple, single small volume anode unit
- Corrosion resistant connection system
- Option to deliver an electrical charge to the steel any-time during the treatment
- Conforms to the latest EN12696 (2012) standard for impressed current cathodic protection, when designed appropriately
- Large charge capacity of up to 500kc with option of sizes*
- Lifetime of up to 20 years*
- Rapid and targeted installation
- Performance can be monitored
- Pre-packaged application mortar
- No need to break-out large areas of good quality concrete



Application

Application shall be in accordance with the 'Installation Guidelines' and is summarised as follows:

PatchGuard Connect anodes are installed following guidelines in EN12696:2012 and CEN/TS 14038– 1:2004 (E). The anode units are typically applied at a density of 4-9 units/m² concrete surface, at a spacing of 350-500mm between anodes. PatchGuard Connect anodes are typically installed into pre-drilled holes of 25 mm diameter using **DuoCrete PG** embedding mortar.

The individual PatchGuard Connect units are then connected electrically to a titanium feeder wire which is connected to the steel reinforcement. This allows an option to deliver an electrical charge to the steel at any point in the future should a change in environmental conditions demand greater protection of the reinforcing. In this case our PatchGuard Connect System conforms to the latest EN12696 (2012) standard for impressed current cathodic protection.

Ancillary Material

The following ancillary materials are also available from CPT Ltd;

- PatchGuard and PatchGuard Plus
- Manganese dioxide reference electrode
- Monitoring equipment



Cert No. 10159

PatchGuard™ Connect

Technical Datasheet



Product Data

PatchGuard Connect™ Dimensions:

PatchGuard Connect: (L) 42 mm x (W) 18 mm

PatchGuard Plus Connect: (L) 77 mm x (W) 18 mm

PatchGuard Ultra Connect: (L) 115 mm x (W) 18 mm

Packaging: 25 Units per box.

Storage: Store dry. Do not allow contact with Oxidizing materials

Limitations

In order that suitable current flow and lifetime can be achieved from the PatchGuard Connect anode, certain practical considerations should be taken into account.

The patch repair material cover for the PatchGuard Connect unit must be a minimum depth of 20mm. When installed in a previous patch repair, the resistivity of the repair material should be in the range of 50-200% of the parent concrete.

Any discontinuous steel should be either electrically bonded to, or electrically isolated from the system negative.

Any cracks or delaminations in the concrete which affect ionic current flow will affect performance of the PatchGuard Connect unit and should thus be pre-treated.

Specification Clause

The discrete anode shall be PatchGuard Connect, a sacrificial alloy anode with an integral titanium electrical connection which can operate in both impressed current and sacrificial anode modes. The PatchGuard Connect anode shall be embedded in DuoCrete PG mortar. The mortar shall retain its pliable properties for a minimum of 48h.

Health and Safety

Protective clothing must be worn. Wear gloves and eye protection at all times.

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Cert No. 10159

ISO 9001

PatchGuard™ Plus

Technical Datasheet



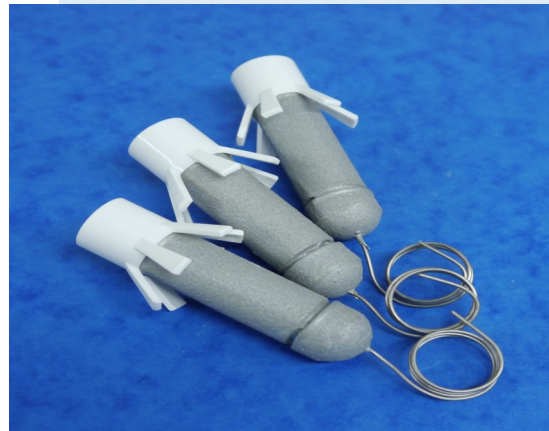
Description

PatchGuard Plus is a discrete sacrificial anode applied to patch repairs on reinforced concrete structures which are corroding as a result of chloride ingress or concrete carbonation.

Many structures suffer corrosion damage due to the incipient effect following concrete patch repairs. Although the fresh mortar in patch repairs halts corrosion of the steel within, it does not deal with chloride contaminated concrete outside the patch repair which is the cause of the corrosion. This leads to further corrosion damage at the periphery of the repair.

PatchGuard Plus anodes redress the electrochemical imbalance induced through removal of the corrosion process from steel in the patch. PatchGuard Plus anodes corrode preferentially to the surrounding steel, protecting it from further corrosion damage.

PatchGuard Plus anodes are located within the parent concrete. Protective current is thus delivered directly to the steel outside the patch which is at greatest corrosion risk as opposed to clean steel within the patch repair. In addition, there is no compromise in the quality of the concrete repair material that can be used in reinstatement, as is typically the case for sacrificial anodes placed within patch repairs. The insulating properties of bonding primers prevents their use with traditional patch anodes – however, as PatchGuard Plus is placed in the parent concrete primers may be used which leads to an enhanced repair bond.



Features

- Simple, single small volume unit
- Corrosion resistant attachment system
- Rapid installation—no additional break out
- Bonding primers can be used
- High resistivity repair mortars can be used
- Targeted application
- Pre-packaged application mortar

Product Data

Packaging: 25 Units per tub.

Storage: Tubs should only be opened when
Product is required.

The lid of the tub should be closed at all times

When not in use. *Do not remove silica gel!*

Ancillary Material

The following ancillary materials are also available from CPT Ltd;

- PatchGuard and PatchGuard Plus
- Manganese dioxide reference electrode
- Monitoring equipment



Cert No. 10159

ISO 9001

PatchGuard™ Plus

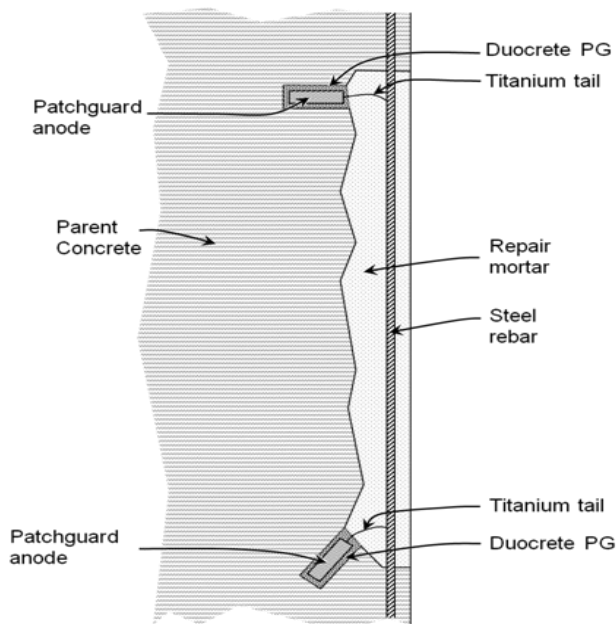
Technical Datasheet



Application

A location for the discrete anodes as close as practical to the edge of the broken out repair shall be selected and holes drilled into the parent concrete within the patch at locations identified by the engineer. A hole of dimensions 25 mm diameter by 90 mm long shall be drilled to house the PatchGuard Plus anode unit.

Pre-wet the drilled hole with water for a minimum of 15 minutes. Once the excess water has been removed



from the bottom of the hole, DuoCrete PG mortar shall be applied into the hole with a nozzle to ensure no entrapment of air voids within the mortar matrix. The PatchGuard Plus anode shall be placed into the hole and inserted such that the DuoCrete PG mortar surrounds the whole unit.

The protruding titanium wire from the anode shall be directly connected to the clean reinforcing steel within the patch repair by winding at least twice around the rebar and fixing the tail with the supplied wire and twisting tool.

Electrical continuity of the PatchGuard Plus anode conductors and the reinforcing steel shall be confirmed. The patch repairs shall be immediately reinstated.

Health and Safety

Protective clothing must be worn. Wear gloves and eye protection at all times.

Specification Clause

The discrete anode shall be PatchGuard a sacrificial alloy anode with an integral electrical connection which allows fixing of the anode at a range of distances from the reinforcing steel and which is formed of a material more noble than steel, the anode unit being embedded within a hole within the patch using a backfill mortar of Ph<12.5, which remains pliable for >48 hours.

Limitations

Concrete repair material cover to the PatchGuard unit must be a minimum of 20 mm.

Concrete repairs must be undertaken in accordance with EN 1504. Any discontinuous steel should be electrically bonded to ensure continuity.

The time to achieve steel protection will be dependent on site conditions. Depolarisation of treated steel will be slower in moist conditions.

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Cert No. 10159

ISO 9001

Fosroc® Renderoc DS

constructive solutions

Polymer modified dry spray repair mortar conforming to the requirements of BS EN 1504-3 Class R4

Uses

Renderoc DS is designed for large area repairs such as bridges, tunnels, retaining walls, dams, etc. The aggregates are chosen so as to be classified as 'non-reactive', and the product has an alkali content (expressed as Na_2O) of less than 3.0 kg/m^3 .

Renderoc DS is specifically designed to comply with the Highways Agency Specification Series 1700 and BD27/86 PE5).

Renderoc DS is suitable for repair method 3.3 and 4.4 as defined by BS EN 1504.

Advantages

- Non-reactive aggregates
- Controlled alkali level
- Low rebound
- Rapid strength gain
- Low water absorption and chloride ion diffusion
- High resistance to carbon dioxide penetration
- Excellent bond to the concrete substrate
- Single component — ready to use
- No added caustic accelerators
- Contains no chloride admixtures

Description

Renderoc DS is supplied as a ready to use blend of dry powders which is formulated for application using the dry spray process. The material is based on Portland cements, graded aggregates silica fume, chemical additives and polymer modifiers, providing a spray mortar with low rebound and good handling characteristics. The low water requirement ensures good strength gain and long term durability.

Buils of up to 150 mm vertically and 90 mm overhead can be achieved in a single application.

Specification Clause

The repair mortar shall be Renderoc DS a one component polymer modified cementitious dry spray mortar conforming to the requirements of BS EN 1504-3 Class R4.

The cured mortar shall achieve a compressive strength of 60 MPa at 28 days and a drying shrinkage of <300 microstrain at 7 days.

Standards compliance

Renderoc DS complies with class R4 according to BS EN 1504-3 repair principals 3.3 and 4.4

Renderoc DS conforms to the requirements of the UK Highways Agency Design Manual for Roads and Bridges (BD27/86, Clause 5) 'Materials for the Repair of Concrete Highway Structures' and has been formulated to comply with the requirements of the Specification for Highways Works Clause 1704.5 Control of Alkali-Silica Reaction.

| | |
|------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| CE | |
| Fosroc Ltd, Drayton Manor Business Park, Coleshill Road, Tamworth, Staffs, B78 3TL | |
| 09 | |
| 0370-CPD-0845 | |
| EN 1504-3 | |
| Concrete repair products for non-structural repair PCC mortar (based on polymer modified hydraulic cement) | |
| Compressive strength | Class R4 ($\geq 45 \text{ MPa}$) |
| Chloride ion content | $\leq 0.05\%$ |
| Adhesive bond strength | $\geq 2.0 \text{ MPa}$ |
| Adhesive bond strength after freeze thaw thermal cycling | $\geq 2.0 \text{ MPa}$ |
| Carbonation resistance | $d_k \leq \text{control concrete}$ |
| Capillary absorption | $\leq 0.5 \text{ kg / m}^2 \cdot \text{h}^{-0.5}$ |
| Elastic modulus in compression | $\geq 20 \text{ GPa}$ |
| Reaction to fire | Class A1 |
| Dangerous substances | Complies with 5.4 |

Fosroc® Renderoc DS

Properties

The following results were obtained at a temperature of 20°C. For further information, refer to the Product Safety Data Sheet.

| Test method | Standard | EN 1504 R4 Requirement | Result |
|-----------------------------------------------------|--------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compressive Strength | EN 12190:1999 | ≥ 45 MPa | @ 1 Day 20 MPa @ 7 Days 45 MPa @ 28 days 60 MPa |
| Bond strength by pull off: | EN 1542:1999 | ≥ 2.0 MPa | 2.7 MPa |
| Chloride ion content: | EN 1015-17:2000 | ≤ 0.05 % | 0.02% |
| Freeze thaw cycling: | EN 13687-1:2002 | ≥ 2.0 MPa | 2.9 MPa |
| Resistance to carbonation d_k | EN 13295:2005 | $d_k \leq$ ref concrete | Complies |
| Elastic Modulus in Compression | EN 13412 | ≥ 20 GPa | 28.6 GPa @28 Days |
| Fire rating | EN 13505-1 | | Class A1 Non-Combustible |
| Setting time | BS 4551 Pt 14:1980 | - | Initial set: 3.5 hours Final set: 5.0 hours |
| Fresh wet density | | - | Nominally 2200 g/m ³ |
| Shrinkage 25 x 25 x 285 prisms, 27 °C, 55% RH | | - | < 300 microstrain @ 7 days |
| Alkali reactive particles | Method TI-B 52 | - | ≤ 1.0 % vol% |
| Capillary absorption | EN 13057 | ≥ 0.5 kg/ m ² /h ^{0.5} | 0.41 kg/ m ² /h ^{0.5} |
| Resistivity | - | - | 28 - 30000 ohm cm |
| Coefficient of thermal Expansion | - | - | 15×10^{-6} /°C |
| Chemical resistance | | - | The low permeability of Renderoc DS severely retards chemical attack in aggressive environments. The cured mortar is impermeable to acid gases, waterborne chloride ions and oxygen. |
| Build Characteristics | | | |
| Minimum thickness: | - | - | 10 mm |
| Overhead: | - | - | Up to 150 mm |
| Vertical: | - | - | Up to 90 mm |

Clarification of property values: The typical properties given are derived from laboratory testing. Results derived from field applied samples may vary

Fosroc® Renderoc DS

Application instructions

Preparation

Clean the surface and remove any dust, unsound or contaminated material, plaster, oil, paint, grease, corrosion deposits or algae. Where breaking out is not required, i.e. concrete is sound and of good quality, but cover is to be increased, roughen the surface and remove any laitance by light scabbling or abrasive-blasting. It will still be necessary to cut back the perimeter to a depth of 10 mm so that the repair patch may be 'toed-in' and finished flush with the surrounding concrete.

Oil and grease deposits should be removed by steam cleaning, detergent scrubbing or the use of a proprietary degreaser. The effectiveness of decontamination should then be assessed by a pull-off test.

Expose fully any corroded steel in the repair area and remove all loose scale and corrosion deposits. Steel should be cleaned to a bright condition paying particular attention to the back of exposed steel bars. Abrasive-blasting is recommended for this process.

Where corrosion has occurred due to the presence of chlorides, the steel should be high-pressure washed with clean water immediately after abrasive-blasting to remove corrosion products from pits and imperfections within its surface.

Reinforcing steel priming

Extra protection to the reinforcing steel can be achieved by application of one full coat of Nitoprime Zincrich Plus and allowing to dry before continuing. If any doubt exists about having achieved an unbroken coating, a second application should be made, and again, allowed to dry before continuing.

Substrate priming

Soak the prepared concrete surface thoroughly, allowing surplus water to drain off.

Application

Exposed steel reinforcing bars should be firmly secured to avoid movement during the application process as this will affect mortar compaction, build and bond.

Renderoc DS should be emptied from the bags directly into the hopper of the dry spray process machine. The amount of water added should be controlled by the nozzleman. Too little water will increase rebound and dust emission, too wet a mix will slump.

If sagging occurs during application to vertical or overhead surfaces, the Renderoc DS should be completely removed and re-applied at a reduced thickness on to the correctly prepared substrate.

Finishing

Renderoc DS is finished by striking off with a straight edge and closing with a steel float. Wooden or plastic floats, or damp sponges may be used to achieve the desired surface texture. The completed surface should not be overworked.

Low temperature working

Normal precautions for winter working with cementitious materials should then be adopted. The material should not be applied when the substrate and/or air temperature is 5°C and falling. At 5°C static temperature or at 5°C and rising, the application may proceed.

High temperature working

At ambient temperatures above 35°C, the material should be stored in the shade.

Curing

Renderoc DS is a cement-based mortar. In common with all cementitious materials, Renderoc DS must be cured immediately after finishing in accordance with good concrete practice, i.e. using wet hessian or polythene. In cold conditions, the finished repair must be protected from freezing.

Cleaning

Renderoc DS should be removed from tools, equipment and mixers with clean water immediately after use. Cured material can only be removed mechanically.

Equipment used with Nitoprime Zincrich Plus should be cleaned with Fosroc Solvent 102.

Estimating

Supply

| | |
|--------------------------|-----------------------|
| Renderoc DS: | 25 kg bags |
| Nitoprime Zincrich Plus: | 1.9ltr and 800ml cans |
| Fosroc Solvent 102: | 5 and 25 litre tins |

Coverage and yield

| | |
|--------------------------|----------------------------------------------------------------------|
| Renderoc DS: | Approx. 12.5 litres / 25 kg bag (approx. 80 bags/m ³) |
| Nitoprime Zincrich Plus: | 8 m ² / litre |

Notes: The actual yield per bag of Renderoc DS will depend on the water addition during application. The coverage figures are theoretical — due to wastage factors and the variety and nature of possible substrates, practical coverage figures will be reduced.

Fosroc® Renderoc DS

Limitations

Renderoc DS should not be used when the temperature is below 5°C and falling. The product should not be exposed to moving water during application. Exposure to heavy rainfall prior to the final set may result in surface scour. If any doubts arise concerning temperature or substrate conditions, consult the Technical Services Department.

Storage

The product has a shelf life of 12 months from the date of manufacture if kept in a dry storage in the original, unopened bags.

Store in unopened bags in cool dry internal conditions. If stored at high temperatures and/or high humidity conditions the shelf life may be reduced to less than 6 months.

Precautions

Health and safety

For further information refer to the appropriate Safety Data Sheets available at www.fosroc.com.

Fire

Renderoc DS is non-flammable.

Nitoprime Zincrich Plus and Fosroc Solvent 102 are flammable. Keep away from sources of ignition. No Smoking. In the event of fire, extinguish with CO₂ or foam. Do not use a water jet.

Flash points

| | |
|--------------------------|------|
| Nitoprime Zincrich Plus: | 41°C |
| Fosroc Solvent 102: | 33°C |



Important note

Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard Conditions for the Supply of Goods and Services, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification of information it may give is accurate and correct, it cannot, because it has no direct or continuous control over where or how its products are applied, accept any liability either directly or indirectly arising from the use of its products, whether or not in accordance with any advice, specification, recommendation of information given by it.

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Certificate number FM 610

Fosroc® Renderoc HBM

constructive solutions

High performance fibre reinforced lightweight concrete reinstatement mortar conforming to the requirements of BS EN 1504-3 Class R3

Uses

For the reinstatement of concrete where low permeability characteristics are required but where high compressive strength is not the most important consideration. If high compressive strength is required Renderoc HB45 should be used.

Renderoc HBM has been specifically developed for vertical and overhead repair work where its lightweight nature and high build characteristics makes it ideal.

Renderoc HBM is suitable for repair methods 3.1, 3.3, 7.1, 7.2 as defined by BS EN 1504-3.

Advantages

- Maximum compatibility with concrete of compressive strength 20 - 35 N/mm²
- Lightweight formulation enables extra high-build — fewer cold joints
- Frequently obviates the need for formwork
- Polymer-modification provides extremely low permeability to water, carbon dioxide and chlorides
- Exceptional system of shrinkage compensation provides long-term dimensional stability
- Can be applied quickly and efficiently by wet spraying
- One component, pre-bagged to overcome site-batched variations
- Contains no chloride admixtures

Description

Renderoc HBM is supplied as a ready to use blend of dry powders requiring only the site addition of clean water to produce a highly consistent, lightweight repair mortar.

It is based on Portland cements, graded aggregates, lightweight fillers and chemical additives which provide a mortar with good handling characteristics while minimising water demand. The low water requirement ensures good strength gain and long-term durability.


Renderoc HBM has been specifically engineered for vertical and overhead repair work. It can be applied in sections up to 60 mm thickness in vertical locations and up to 40 mm thickness in overhead locations in a single application and without the use of formwork. Thicker sections can be achieved by the use of formwork or can be built up in layers. Deep pockets can sometimes be filled in a single application dependent on the configuration of the pocket and the volume of exposed reinforcing steel.

Renderoc HBM can be quickly and efficiently applied by the wet spray technique. Consult the local Fosroc office for further information.

The material should not be applied at less than 10 mm thickness.

Standards compliance

Renderoc HBM complies with the class R3 according to EN1504-3, repair methods 3.1, 3.3, 7.1 and 7.2.

| | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------|
|  | |
| Fosroc Ltd, Drayton Manor Business Park, Coleshill Road, Tamworth, Staffs, B78 3TL 09 0370-CPD-0845 | |
| EN 1504-3 Concrete repair products for structural repair PCC mortar (based on polymer modified hydraulic cement) | |
| Compressive strength | Class R3 (≥ 25 MPa) |
| Chloride ion content | ≤ 0.05 % |
| Adhesive bond | ≥ 1.5 MPa |
| Adhesive bond strength after freeze thaw thermal cycling | ≥ 1.5 MPa |
| Carbonation resistance | $d_k \leq$ control concrete |
| Reaction to fire | Class A2 s1 d0 |
| Dangerous substances | Complies with 5.4 |

Fosroc® Renderoc HBM

Properties

The following results were obtained at a water : powder ratio of 0.18 and at a temperature of 20°C unless otherwise stated.

| Test method | Standard | EN 1504 R3 Requirement | Test result |
|------------------------------------|-------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compressive Strength | EN 2190:1999 | ≥ 25 MPa | @ 1 Day 10 MPa @ 28 Days 30 MPa |
| Bond strength by pull off: | EN 1542:1999 | ≥ 1.5 MPa | 1.8 MPa |
| Chloride ion content: | EN 1015-17:2000 | ≤ 0.05 % | 0.02% |
| Freeze thaw cycling: | EN 13687-1:2002 | ≥ 1.5 MPa | 1.7 MPa |
| Resistance to carbonation d_k | EN 13295:2005 | $d_k \leq$ ref concrete | Conforms |
| Fire rating | EN 13501-1 | - | Class A2 s1 d0 Non-Combustible |
| Flexural strength | BS 6319 Pt 3:1990 | - | 5.2 MPa @ 28 days |
| Tensile strength | BS 6319 Pt 3:1985 | - | 2.5 MPa @ 28 days |
| Setting time | BS 4551 Pt14:1980 | - | Initial set: 3 hours Final set: 5 1/2 hours |
| Fresh wet density | | - | Nominally 1700 kg/m ³ |
| Chemical resistance | - | - | The low permeability of Renderoc HBM severely retards chemical attack in aggressive environments. The cured mortar is impermeable to acid gases, waterborne chloride ions and oxygen. |
| Build Characteristics hand applied | | | |
| Minimum thickness: | - | - | 10mm |
| Overhead: | - | - | Up to 40 mm |
| Vertical: | - | - | Up to 60 mm |

Clarification of property values: The typical properties given above are derived from laboratory testing. Results derived from field applied samples may vary.

Application instructions

Preparation

Saw cut the edges of the repair to a depth of at least 10 mm to provide a square edge. Break out the complete repair area to a minimum depth of 10 mm up to the sawn edge.

Clean the surface and remove any dust, unsound or contaminated material, plaster, oil, paint, grease, corrosion deposits or algae. Where breaking out is not required, roughen the surface and remove any laitance by light scabbling or abrasive-blasting.

Oil and grease deposits should be removed by steam cleaning, detergent scrubbing or the use of a proprietary degreaser. The effectiveness of decontamination should then be assessed by a pull-off test.

Expose fully any corroded steel in the repair area and remove all loose scale and corrosion deposits. Steel should be cleaned to a bright condition paying particular attention to the back of exposed steel bars. Abrasive-blasting is recommended for this process.

Where corrosion has occurred due to the presence of chlorides, the steel should be high-pressure washed with clean water immediately after abrasive-blasting to remove corrosion products from pits and imperfections within its surface.

Reinforcing steel priming

Prime steel with mixed Renderoc Primer. For mixing instructions see below.



Fosroc® Renderoc HBM

Concrete Priming

The concrete substrate should be saturated surface dry immediately before the application of the primer i.e. it should be thoroughly saturated with clean water and any residual surface water removed prior to applying Renderoc Primer.

Under severe drying conditions repeated soaking may be necessary to ensure the substrate is still saturated at the time of application of the primer.

Add 3 parts by volume of Renderoc Primer Part A to 1 part by volume Renderoc Primer Part B (4 to 1 by weight) in a clean mixing vessel and mix with a spatula or slow speed drill and paddle until a homogeneous slurry is produced.

Scrub Renderoc Primer slurry into the surface.

Renderoc HBM can be applied immediately to the primed surface. If the primer dries apply another coat of primer before continuing.

Open bags of Renderoc Primer Part A should be sealed and stored in a dry area. Use within 14 days.

In exceptional circumstances, e.g. where a substrate/repair barrier is required or where the substrate is water immersed or likely to remain permanently damp, Nitobond EP bonding aid should be used. Contact the local Fosroc office for further information.

Mixing

Care should be taken to ensure that Renderoc HBM is thoroughly mixed. A forced-action mixer is essential. Mixing in a suitably sized drum using an approved Renderoc Spiral Paddle with a slow speed (400/500 rpm) heavy-duty drill is acceptable for the occasional one-bag mix.

Free-fall mixers must not be used. Mixing of part bags should never be attempted.

For normal applications, place 3.8 to 4.2 litres of drinking quality water into the mixer.

With the machine in operation, add one full bag of Renderoc HBM and mix for a minimum of 3 minutes and a maximum of 5 minutes, until fully homogeneous.

The consistency may be adjusted by the addition of small amounts of water up to the maximum total water content of 4.2 litres.

Note that the powder must always be added to the water.

Mixing warning

As with other 'one pack' repair mortars, Renderoc HBM may exhibit satisfactory handling characteristics even though inadequately mixed. This will result in a significantly lower level of performance or possible failure. It is therefore essential that mixing instructions are strictly adhered to with particular emphasis on the quantity of water used and the time of the mixing operation.

Application

Exposed steel reinforcing bars should be firmly secured to prevent movement during application. Apply the mixed

Renderoc HBM by gloved hand or trowel, thoroughly compacting onto the primed substrate and around exposed reinforcement.

If sagging or slumping occurs the Renderoc HBM should be completely removed and reapplied at a reduced thickness to a correctly primed substrate.

Build-up

Additional build-up can be achieved by application of multiple layers.

The surface of the intermediate layers should be comb scratch-keyed and cured with Nitobond AR. Repriming with Renderoc Primer and a further application of Renderoc HBM may proceed as soon as this layer has set.

Spray application

Renderoc HBM can be quickly and efficiently applied by the wet spray technique. In circumstances where large areas of repair are required, the rapid placement and higher build attainable by this method offer economic advantages over hand-trowelling. The resultant repair also offers a generally more dense compound with enhanced mortar/substrate bond characteristics.

For further details on wet spray techniques contact the local Fosroc office.

Finishing

Renderoc HBM is finished by striking off with a straight edge and closing with a steel float. Wooden or plastic floats, or damp sponges, may be used to achieve the desired surface texture. The completed surface should not be overworked. After spray application, the mortar may need to be 'cut back' to the required profile using a steel float and then finished with damp sponges as described above.

Low temperature working

In cold conditions down to 5°C, the use of warm mixing water (up to 30°C) is advisable to accelerate strength development. Normal precautions for winter working with cementitious materials should then be adopted. The material should not be applied when the substrate and/or air temperature is 5°C and falling. At 5°C static temperature or at 5°C and rising, the application may proceed.

High temperature working

At ambient temperatures above 35°C, the material should be stored in the shade and cool water used for mixing.

Curing

Renderoc HBM is a cement-based repair mortar. In common with all cementitious materials, it must be cured immediately after finishing in accordance with good concrete practice. The use of Nitobond AR, sprayed on to the surface of the finished mortar in a continuous film, is recommended. A low pressure atomising sprayer is essential for applying the Nitobond AR. Any excessive run-off on verticals or drips on soffits should be removed by brush before they harden.

Fosroc® Renderoc HBM

Large areas should be cured as trowelling progresses (0.5 m² at a time) without waiting for completion of the entire area.

In fast drying conditions, supplementary curing with polythene sheeting taped down at the edges must be used. In cold conditions, the finished repair must be protected from freezing.

Overcoating with protective decorative finishes

Renderoc HBM is extremely durable and will provide long-term protection to the embedded steel reinforcement within the repaired locations. The surrounding parts of the structure will benefit from the application of a barrier/decorative coating to limit the advance of chlorides and carbon dioxide, bringing them to the same protective standard as the repair itself. Fosroc recommend the use of the Dekguard range of protective, anti-carbonation coatings. These products provide a decorative and uniform appearance as well as protecting areas of the structure which might otherwise be at risk from the environment. Dekguard products may be applied over the repair area without prior removal of the Nitobond AR curing membrane. Other curing membranes must be removed prior to the application of Dekguard products.

Cleaning

Renderoc HBM and Renderoc Primer should be removed from tools, equipment and mixers with clean water immediately after use. Cured material can only be removed mechanically.

Clean tools used with Nitobond EP before material cures, using Fosroc Solvent 102.

Estimating

Supply

| | |
|---------------------|--------------------------------|
| Renderoc HBM: | 22 kg bags |
| Renderoc Primer | 20 Kg Part A + 5 litres part B |
| Nitobond AR: | 5 and 25 litre drums |
| Fosroc Solvent 102: | 5 and 25 litre tins |

Coverage and yield

| | |
|-----------------|--------------------------------------------------------------------------------------------|
| Renderoc HBM: | Approximately 15.0 litres / 22kg bag (approximately 1.5 m ² at 10 mm thickness) |
| Nitobond AR: | 6 - 8 m ² / litre |
| Renderoc Primer | Approximately 13 litres - 2m ² /litre |

Notes: the actual yield per bag of Renderoc HBM will depend on the consistency used. The yield will be reduced if the material is applied by a spray technique.

Limitations

Renderoc HBM should not be used when the temperature is below 5°C and falling. Do not mix part bags. Due to the lightweight nature of Renderoc HBM, the product should not be used in areas subjected to traffic (in these circumstances, Renderoc S should be considered).

Renderoc HBM should not be exposed to moving water during application. Exposure to heavy rainfall prior to the final set may result in surface scour.

If any doubts arise concerning temperature or substrate conditions, consult the local Fosroc office.

Storage

Renderoc HBM and Renderoc Primer have a shelf life of 12 months from the date of manufacture if kept in dry storage in the original, unopened bags. If stored at high temperatures and/or high humidity the shelf life may be reduced to less than 6 months.

Nitobond AR and Renderoc Primer Part B should be protected from frost.

Precautions

Health and safety

For further information refer to the appropriate Safety Data Sheets available at www.fosroc.com

Fire

Renderoc HBM is non-flammable.

Fosroc Solvent 102 is flammable. Keep away from sources of ignition. No Smoking. In the event of fire, extinguish with CO₂ or foam. Do not use a water jet.

Flash points

| | |
|---------------------|------|
| Fosroc Solvent 102: | 33°C |
|---------------------|------|

Renderoc is the trade mark of Fosroc International Limited



Important note

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Certificate number FM 610

Protective cementitious coating and levelling mortar for applications from feather edge to 5mm conforming to the requirements of BS EN 1504-3 Class R4

Uses

For application in thin layers, the filling of blow-holes or imperfections in concrete to produce a smooth surface.

Providing a chloride and carbonation barrier. It can be left as a fair-face finish or overcoated.

It can be used as a scrape-coat, brush or trowel applied, placed in thicknesses from 0-5 mm.

Renderoc ST 05 is suitable for repair methods: 1.3, 2.2, 5.1, 6.1 and 8.2 as defined by BS EN 1504-2: 3.1, 7.1 and 7.2 as defined by BS EN 1504-3

Advantages

- Easy to mix and apply
- Vertical and horizontal applications
- Excellent bond to concrete without priming
- Formulated blow hole filler
- Carbonation barrier
- Chloride barrier
- High frost resistance
- High compressive strength

Description

Renderoc ST 05 consists of powder and polymer components. The powder is added to the liquid, the mixing ratio depends on the required consistency and use.

The powder consists of a blend of cements, graded aggregates and chemical additives, with a maximum grain sizes of 0.5 mm

The liquid component, based on modified acrylic polymers, gives Renderoc ST 05 a creamy consistency with extremely good application and barrier characteristics.

The product exhibits excellent thermal compatibility with concrete and is fully compatible with other Renderoc mortars and Dekguard coatings.

Exposure to rainfall prior to the final set may result in water uptake and severe reduction in the performance of the hardened product. Exposure to mist or high humidity prior to sufficient hardening may result in discolouration of the surfaces. These white discolourations will decrease with time.

Standards Compliance

Renderoc ST 05 complies with repair principles 1.3, 2.2, 5.1, 6.1 and 8.2 as defined by BS EN 1504-2

Renderoc ST 05 complies with Class R4 according to BS EN 1504-3, repair principles 3.1, 7.1, 7.2.

| CE | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Fosroc Ltd, Drayton Manor Business Park, Coleshill Road, Tamworth, Staffs, B78 3TL 09 0370-CPD-0845 | |
| EN 1504-2-3 Surface protection systems Concrete repair products for structural repair PCC mortar (based on polymer modified hydraulic cement) | |
| Compressive strength | Class R4 (> 45 MPa) |
| Chloride ion content | < 0.05 % |
| Adhesive bond strength | > 2.0 MPa |
| Adhesive bond strength after freeze thaw thermal cycling | > 2.0 MPa |
| Carbonation resistance | $d_k < \text{control concrete}$ |
| Reaction to fire | Class A2 s1 d0 |
| Dangerous substances | Complies with 5.4 |
| Abrasion resistance | weight loss < 3000 mg |
| Impact resistance | Class III |
| Permeability to CO ₂ | sd > 50 m |
| Permeability to water vapour | Class I |
| Liquid water transmission rate | $w < 0.1 \text{ kg/m}^2\text{h}^{-0.5}$ |

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Renderoc ST 05

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CI/SfB:
January 2012

Properties

Material tested at liquid : powder ratio of 0.22 and temperature at 20°C

| Test method | Standard | EN 1504 Requirement | Test result |
|--------------------------------------------|-------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------|
| Compressive Strength | EN 12190:1999 | ≥ 45 MPa | @ 1 Day 13 MPa @ 3 Days 26 MPa @ 7 Days 37 MPa @ 28 Days 50 MPa |
| Bond strength by pull off: | EN 1542:1999 | ≥ 2.0 MPa | 2.8 MPa |
| Chloride ion content: | EN 1015-17:2000 | ≤ 0.05 % | 0.01% |
| Freeze thaw cycling: | EN 13687-1:2002 | ≥ 2.0 MPa | 2.7 MPa |
| Resistance to carbonation d_k | EN 13295:2005 | ≤ ref concrete | Complies |
| Fire rating | EN 13505-1 | - | Class A2 S1 d0 (Non-Combustible) |
| Flexural strength | BS 6319 Pt 3:1990 | - | 11 MPa @ 28 days |
| Initial set at 20°C Final set at 20°C | - | - | 5 1/2 hours 6 hours |
| Fresh wet density | - | - | Nominally 1950 kg/m ³ |
| Alkali reactive particles | Method TI-B 52 | - | ≤ 1% vol% |
| Resistance to severe chemical attack | EN 13529 | Hardness reduction < 50% Class III - 28 days with pressure | Class III in groups 3,10,11,12,14a |
| Capillary absorption | EN 13057 | ≤ 0.5 kg/m ² h ^{0.5} | 0.2 kg/m ² h ^{0.5} |
| Application of repair mortar overhead | EN 13395-4 | ≥ 2 MPa | 2.8 MPa |
| Permeability to water vapour | EN ISO 7783-2 | - | Sd 0.48m (Class I) |
| Determination of liquid water transmission | EN 1062-3 | ≤ 0.1 kg/m ² h ^{0.5} | 0.08 kg/m ² h ^{0.5} |
| Permeability to CO ₂ | EN 1062-6 | Sd > 50 m | Sd = 57 m |
| Abrasion resistance | EN ISO 5470 -1 | Weight loss < 3000 mg | 2785 mg |
| Impact resistance | EN ISO 6272-1 | Class III ≥ 20 Nm | 24.5 Nm |
| Chloride ion ingress | EN 13396 | - | 0.171% after 6 months in 3% NaCl solution at 4-6 mm depth |
| Chloride penetration (w/c 0.45) | NT Build 443 | - | 1 mm of Renderoc ST 05 is equivalent to 13mm of concrete with a 0.45 w/c ratio |
| Carbonation Barrier Properties | NT Build 357 | - | <R(b) = 21 mm for a 2 mm thickness of Renderoc ST 05 |

Clarification of property values: The typical properties given above are derived from laboratory testing. Results derived from testing field applied samples may vary.



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Renderoc ST 05

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January 2012

| Build characteristics | Thickness | Volume of liquid per 20kg bag of powder | Coverage per pack (Coverage can vary due to substrate) |
|-----------------------------------------------------------------------------|------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Vertical applications: Brush/roller Trowel Trowel blow hole filler | 1 mm 2 mm Skim applied | 4.5 - 5.0 litres 4.0 - 4.5 litres 5 litres | 11.5 - 12 m ² @ 1 mm 5.5 - 5.75 m ² @ 2 mm Circa 12m ² dependent on surface |
| Horizontal applications: Trowel / screed Brush / roller | 4 mm 4 mm | 4.5 - 5 litres 5 litres | 2.8 - 3.0 m ² @ 4 mm 3.0 m ² @ 4 mm |

Preparation

Surfaces must be clean and sound, with no traces of loose material, cement paste, laitance, dust, plaster, oil, grease, corrosion deposits or algae.

Prepare the surfaces by abrasive grit blasting or light scabbling. Remove oil and grease with suitable detergent. Finally the cleaned surfaces should be blown clean with oil free compressed air before continuing.

On floors, large pockets greater than 4 mm depth should be filled with Fosroc XR90, finished with a scratched surface. Allow one hour to cure before application of Renderoc ST 05.

Pre-soaking

All prepared areas should be thoroughly soaked with clean water prior to application of Renderoc ST 05, to achieve a saturated surface dry condition. Any residual surface water should be removed prior to application.

Priming

Under normal circumstances priming is not required. However, porous substrates may require sealing with Nitobond AR. This is scrubbed onto the pre-wetted substrate and allowed to become tacky before applying Renderoc ST 05.

Mixing

Renderoc ST 05 should be mixed in a forced action mixer of adequate capacity. Mixing in a suitable sized drum using a Conbextra paddle with a slow speed (500 rpm) heavy-duty drill is acceptable.

Place the required amount of Renderoc ST 05 liquid component - see table - in the mixer and add the full bag of Renderoc ST 05 powder. Mix for 5 minutes until fully homogeneous. Let the mix rest for 5-10 minutes and adjust the consistency, if necessary by addition of additional liquid component. Mix for another minute until the required consistency is obtained. Polymer level can be varied to application method.

Mixing ratios:

Brush coating - 5.0 ltrs liquid : 20 kg powder
Fairing coat - 4.0 ltrs liquid : 20 kg powder

The above mixing ratios can be used as guidelines. Part packs can be mixed provided mix ratios are maintained.

Application

Renderoc ST 05 can be applied by brush, roller or trowel depending on consistency and application. See table.

The surface finish of the final coat can be obtained in the following ways:

- I) Smooth surface: Finish with a sponge.
- II) Rough, granulated surface: Finish with a roller.
- III) Skid resistant surface: Sprinkle dry quartz sand in the wet surface or brush finish.

Multiple layers

When applying multiple layers, allow the first application to dry for between 2-4 hours (at 20°C). Lightly scratch and dampen surface between layers. Patches at 300 mm² or less can be applied up to 5mm in one application when cured.

Low temperature working

Normal precautions for winter working with cementitious materials should be adopted. In cold conditions down to +5°C, both components should be kept at +15°C to +25°C. Protect applied product from freezing for the first 24 hours. Note: working time and time taken to gain strength will be increased at lower temperatures.

High temperature working

At ambient temperatures above 35°C both components should be stored in the shade. Note working times will be reduced at elevated temperatures.



Fosroc®

Renderoc ST 05

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CI/SfB:
January 2012

Curing

Renderoc ST 05 is a cement-based repair mortar. In common with all cementitious materials, it must be cured immediately after finishing in accordance with good concrete practice. The use of Nitobond AR, sprayed on to the surface of the finished mortar in a continuous film, is recommended. A low pressure atomising sprayer is essential for applying the Nitobond AR. Any excessive run-off on verticals or drips on soffits should be removed by brush before they harden.

Large areas should be cured as trowelling progresses (0.5 m² at a time) without waiting for completion of the entire area.

Overcoating with protective decorative finishes

Renderoc ST 05 is extremely durable and will provide long-term protection to the embedded steel reinforcement within the repaired locations. The surrounding parts of the structure will benefit from the application of a barrier/decorative coating to limit the advance of chlorides and carbon dioxide, bringing them to the same protective standard as the repair itself. Fosroc recommend the use of the Dekguard range of protective, anti-carbonation coatings. These products provide a decorative and uniform appearance as well as protecting areas of the structure which might otherwise be at risk from the environment. Dekguard products may be applied over the repair area without prior removal of the Nitobond AR curing membrane. Other curing membranes must be removed prior to the application of Dekguard products.

Cleaning

Renderoc ST 05 should be removed from tools, equipment and mixers with clean water immediately after use. Cured material can only be removed mechanically.

Estimating

Supply

Renderoc ST 05 is supplied in 20kg bags of powder and 5.0 litres of liquid.

Coverage and yield

Approximately 12 litres per pack depending on mix ratio - see table for coverage.

Limitations

Renderoc ST 05 should not be applied when the substrate and/or air temperature is below +5°C and falling.

Application at high humidity and/or on a falling thermometer may result in a white surface discolouration. This will not affect product performance and should decrease with time.

Not suitable for heavily trafficked floors.

Storage

Renderoc ST 05 Powder has a shelf life of 12 months if kept in a dry store in the original, unopened packaging.

If stored at high temperatures and/or high humidity conditions the shelf life may be reduced.

Renderoc ST 05 Liquid should be stored at +5°C indoors and protected against frost. If the product has been exposed to frost and the liquid component becomes grainy, it should not be used.

Precautions

Health and safety

For further information refer to the Safety Data Sheets available at www.fosroc.com.

Fire

Renderoc ST 05 is non-flammable.

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Important note

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Certificate number FM 610

Fosroc® Thioflex 600

constructive solutions

Multi-component, gun and pouring grade, polysulfide sealant

Uses

Sealing movement joints in building and civil engineering structures, including superstructures, floors, basements and subways.

Advantages

- Meets key international standards
- Forms a tough, elastic, rubber-like seal
- Accommodates continuous and pronounced cyclic movement
- Excellent adhesion to most common substrates, including primed concrete, glass, aluminium and stainless steel
- High resistance to ageing reduces physical damage due to climatic extremes

Description

Thioflex 600 is available in gun and pouring grades. The gun grade is ideal for general application. It is packed in a ready to mix, 2.5 litre tin containing the base and curing agent in the correct proportions. The pouring grade for joints in horizontal surfaces is supplied in 5 litre packs with the base and curing agent in separate tins.

Thioflex 600 is particularly recommended for use in high-rise buildings and other applications where access for subsequent maintenance will be difficult and the risk of early movement failure must be minimised. It is also suitable for sealing joints in brickwork, retaining walls, basements and subways.

Thioflex 600 pouring grade is recommended for initial sealing of expansion joints and stress relief joints in floors and sealing other horizontal surfaces.

Design criteria

Thioflex 600 may be applied to joints between 5 and 50 mm wide. Joints which are expected to experience cyclic movements should be designed to an optimum width : depth ratio of 2: 1, subject to the overriding recommended minimum sealant depths set out below:

- 5 mm for metals, glass and other non-porous surfaces;
- 10 mm for all porous surfaces;
- 20 mm for trafficked joints and those subject to hydrostatic pressures.

To ensure that the sealant remains within its stated movement capacity (25% MAF), sealing slot widths should be designed in accordance with the recommendations of BS 6093.

The use of a surface primer is always required on porous surfaces. On non-porous surfaces a primer is not normally required except where glass or glazed surfaces are to be permanently immersed in water.

Standards compliance

British Standard BS 4254 : 1983.

U.S. Federal Specification TT-S-00227E November 1969 (amended 1970).

DTp specification for Highway Works December 1991 series 1000 clause 1017.

ASTM C920-87: Type M, Grade NS, Class 25.

Properties

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|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------|-----------|----------------|-----------|--------|-----------|----------------|-----------|-------------|-----------|----------|-----------|------------------|-----------|---------|-----------|--------------|-----------|----------------------|---------------|-------------------|---------------|------------------------|---------------|
| Form: | Multi-part, paste compound | | | | | | | | | | | | | | | | | | | | | | | | | |
| Colours: | Gun grade: grey Pouring grade: grey | | | | | | | | | | | | | | | | | | | | | | | | | |
| Movement accommodation factor (BS 6093): | 25% butt joints 50% lap joints | | | | | | | | | | | | | | | | | | | | | | | | | |
| Physical or chemical change: | Chemical cure | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pot life: | 2 hours @ 25°C | | | | | | | | | | | | | | | | | | | | | | | | | |
| Setting time: | 72 hours at 5°C 36 hours at 15°C 18 hours at 25°C | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cure time: | 4 weeks at 5°C 2 weeks at 15°C 1 week at 25°C | | | | | | | | | | | | | | | | | | | | | | | | | |
| Application temperature: | 5°C to 50°C | | | | | | | | | | | | | | | | | | | | | | | | | |
| Operating temperature: | –20°C to +60°C | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hardness shore 'A' 25°C: | Gun grade grey: 20 to 25 Pouring grade: 15 to 23 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water immersion: | Thioflex 600 must be fully cured before permanent immersion in water | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chemical resistance to occasional spillage: | <table><tr><td>Dilute acids</td><td>resistant</td></tr><tr><td>Dilute alkalis</td><td>resistant</td></tr><tr><td>Petrol</td><td>resistant</td></tr><tr><td>Aviation fuels</td><td>resistant</td></tr><tr><td>Diesel fuel</td><td>resistant</td></tr><tr><td>Kerosene</td><td>resistant</td></tr><tr><td>Lubricating oils</td><td>resistant</td></tr><tr><td>Skydrol</td><td>resistant</td></tr><tr><td>White spirit</td><td>resistant</td></tr><tr><td>Chlorinated solvents</td><td>not resistant</td></tr><tr><td>Aromatic solvents</td><td>not resistant</td></tr><tr><td>Dilute oxidising acids</td><td>not resistant</td></tr></table> | | Dilute acids | resistant | Dilute alkalis | resistant | Petrol | resistant | Aviation fuels | resistant | Diesel fuel | resistant | Kerosene | resistant | Lubricating oils | resistant | Skydrol | resistant | White spirit | resistant | Chlorinated solvents | not resistant | Aromatic solvents | not resistant | Dilute oxidising acids | not resistant |
| Dilute acids | resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dilute alkalis | resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Petrol | resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aviation fuels | resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Diesel fuel | resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kerosene | resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lubricating oils | resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Skydrol | resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| White spirit | resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chlorinated solvents | not resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aromatic solvents | not resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dilute oxidising acids | not resistant | | | | | | | | | | | | | | | | | | | | | | | | | |
| Biological resistance: | Thioflex 600 has been evaluated in microbiologically active situations and has been shown to have resistance to aerobic conditions | | | | | | | | | | | | | | | | | | | | | | | | | |
| Solids content: | 100% | | | | | | | | | | | | | | | | | | | | | | | | | |
| Density: | 1.62 kg/litre | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flash point: | Over 65°C | | | | | | | | | | | | | | | | | | | | | | | | | |
| Flammability: | Burns but does not readily support combustion | | | | | | | | | | | | | | | | | | | | | | | | | |

Fosroc® Thioflex 600

Application instructions

Joint preparation

The joint surfaces must be thoroughly dry, clean and frost free. Remove all dust and laitance by rigorous wire brushing, grinding or grit blasting. Remove all rust, scale and protective lacquers from metal surfaces. Remove any oil or grease with Fosroc Equipment Cleaner.

Any expansion joint filler must be checked to ensure it is tightly packed and no gaps or voids exist at the base of the sealing slot before positioning a bond breaker.

Note: The use of a bond breaker is not required in expansion joints containing Hydrocell XL or Expandafoam cellular polyethylene expansion joint fillers. For construction or contraction joints a bond breaker tape or back-up strip should be used. Where hydrostatic pressure exists, only bond breaking tapes must be used, not foamed back-up strips.

Where a particularly neat finish is required, mask the face edges of the joint before priming and remove immediately after tooling is completed.

Priming

When Fosroc Primers 4 or 7 are required, these should be used as follows:

Fosroc Primer 4: For use on glass and ceramics which are to be permanently immersed in water. It is a one part chemically active clear liquid for brush or pad application. One thin coat should be applied and allowed to dry for 2 to 5 minutes prior to sealant application.

Fosroc Primer 7: It is a one part chemically active clear liquid for brush application to concrete, stone, brickwork, timber and unglazed edges of ceramic tiles. One thin coat should be applied using a clean, dry brush, ensuring complete coverage. Avoid over priming resulting in an excess of primer in the base of the joint or application beyond faces. The mixed Thioflex 600 must be applied when the primer is tack free, that is after the evaporation of the solvent but before the primer film has completely reacted. After 3 hours the surfaces must be re-primed before applying the sealant.

Iron and steel must be protected with an anti-corrosion primer prior to sealing.

Mixing

Gun grade: The base component and curing agent are supplied ready for mixing in a single tin. Mix thoroughly using a slow speed drill (300 to 500 rpm) fitted with a Fosroc Sealant Mixing Paddle for 5 minutes. Only thorough mixing, including material right at the bottom of the tin, will result in proper curing. In cold weather Thioflex 600 mixes more easily if stored overnight at room temperature.

Immediately after mixing, load the sealant into a Fosroc 'G' Gun using the Follower Plate, and apply to the joint.

Pouring grade: Thioflex 600 pouring grade is supplied in two separate containers, the base in the larger tin and the curing agent in a sachet. The sachet contents should be transferred to the tin, and mixed as per the gun grade instructions. The pouring grade may be poured directly into horizontal joints or for application to horizontal joints less than 15 mm wide loaded into a Fosroc 'G' Gun.

Finishing

Thioflex 600 should be tooled to a smooth finish. A minimum of surface lubricant such as dilute detergent solution may be used to assist the process. Any masking tape should be removed immediately after tooling.

Cleaning

Clean equipment immediately after use with Fosroc Equipment Cleaner.

Contract application

The designer or contractor may wish to use the services of a specialist sub-contractor for joint sealing work. Names of preferred sub-contractors are available from Fosroc.

Maintenance

No special requirements, any damage identified during normal building inspections should be repaired or replaced as appropriate.

Estimating

Packaging

Thioflex 600 gun grade is supplied in 2.5 litre tins in cartons of four.

Thioflex 600 pouring grade is supplied in a 5 litre tin, curing agent included in a sachet inside the tin.

Fosroc® Thioflex 600

Guide to quantities

| Joint size in mm | Litres per metre run | Metre run per 2.5 litre pack | Metre run per 5 litre pack |
|------------------|----------------------|------------------------------|----------------------------|
| 5 x 5 | 0.025 | 100.00 | 200.00 |
| 5 x 10 | 0.050 | 50.00 | 100.00 |
| 10 x 10 | 0.100 | 25.00 | 50.00 |
| 20 x 10 | 0.200 | 12.50 | 25.00 |
| 20 x 15 | 0.300 | 8.33 | 16.67 |
| 20 x 20 | 0.400 | 6.25 | 12.50 |
| 40 x 20 | 0.800 | 3.12 | 6.25 |
| 40 x 25 | 1.000 | 2.50 | 5.00 |
| 40 x 30 | 1.200 | 2.00 | 4.00 |
| 40 x 40 | 1.600 | 1.56 | 3.12 |
| 50 x 25 | 1.250 | 2.00 | 4.00 |
| 50 x 30 | 1.500 | 1.67 | 3.33 |
| 50 x 40 | 2.000 | 1.25 | 2.25 |
| 50 x 50 | 2.500 | 1.00 | 2.00 |

1 litre of Fosroc Primer 4 to 300 litres of Thioflex 600

1 litre of Fosroc Primer 7 to 30 litres of Thioflex 600.

These are theoretical yields. No allowance has been made for variation in joint width or wastage.

Limitations

Over-painting of sealants is not recommended because of the inability of paint films to accept movement. However, if definitely required, trials should be carried out to determine compatibility.

Thioflex 600 should not be used in direct contact with materials containing pitch or bitumen.

Thioflex 600 is not suitable for use in contact with potable water; Nitoseal MS600 should be used.

Storage

Storage life of 12 months in original containers when kept in dry conditions between 5°C and 27°C.

Precautions

Health and safety

For further information refer to appropriate Product Safety Data Sheet.

Fosroc and Thioflex are trademarks of Fosroc International Limited



Important note

Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard Conditions for the Supply of Goods and Services, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification of information it may give is accurate and correct, it cannot, because it has no direct or continuous control over where or how its products are applied, accept any liability either directly or indirectly arising from the use of its products, whether or not in accordance with any advice, specification, recommendation of information given by it.

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Certificate number FM 610

Water Repellent Cream WRP7

Technical Datasheet



Description

Water repellent cream WRP7 is a unique impregnating agent. It is in the form of a cream to impregnate reinforced concrete and render the surface resistant to moisture ingress. Unlike conventional liquid products, water repellent cream WRP7 can be applied in just one coat of the desired thickness (at the very most, two coats). The silane active ingredient penetrates the substrate within 30 minutes to several hours, the exact time depending on the porosity and thus quality of the concrete. On reaction with the substrate, it releases ethanol and is converted into a polymeric silicone resin. A creamy layer forms initially, but this then disappears completely. As the active ingredient is the same as in conventional liquid impregnating agents, impregnation with Water repellent cream WRP7 does not clog the pores or capillaries, nor does it affect its ability to 'breathe'.

Water repellent cream WRP7 is designed to penetrate deeply into concrete so as to afford optimum protection against absorption of water and pollutants as well as freeze/thaw cycles. This effect should not be confused with the 'beading' effect imparted by impregnating agents that is often referred to as water repellence. Beading is only a surface effect, and it plays a secondary role in protecting the substrate. Concrete treated with Water repellent cream WRP7 has initially only a moderate beading effect, but this increases after the surface has been wetted.

Features

- Substantial reduction in water absorption in concrete
- Reduces penetration of water soluble chloride salts
- Resistance to high pH
- Good penetration depth
- Paints can be applied to treated surface*
- Low volatility
- Thixotropic nature facilitates effective installation

*It is always advisable to undertake a compatibility test prior to over-painting

Product Data

- **Appearance:** white to yellowish cream
- **Active substance content, approx. [wt%]:** 80
- **Density at 25°C, approx. [g/cm3]:** 0.9
- **pH, approx.:** 7
- **Flash point, approx. [°C]:** 74
- **Product form:** cream

Specification Clause

The impregnant material shall be Water Repellent Cream WRP7, an aqueous, thixotropic material with the consistency of a cream. The material shall be solventless with minimum active material content of 80%. The material shall have been tested by BRE, TRL and TNO.



ISO 9001

Water Repellent cream WRP7

Technical Datasheet



Application

Application is typically undertaken in a single coat. Water repellent cream WRP7 is best applied to the concrete by the airless technique, undiluted and in the desired thickness. Brushes, lambskin rollers or spatulas may be used for smaller areas.

Up to 300 g/m² may be applied in one operation to vertical surfaces and roofs, without loss of material. The exact amount depends on the absorbency of the substrate. If the substrate is of high quality and hence not very absorbent, do not apply more than roughly 200 g/m² in one operation, as it may take several hours to penetrate completely. At higher application rates, the impregnating film might liquefy because of the concrete's alkalinity and it might start to run off. A second coat of Water repellent cream WRP7 may be applied at any time, but is usually unnecessary.

To ensure that new concrete sets properly, it is best to wait at least two weeks, preferably four, before applying impregnation. Remove coarse particles and dust from new unsoiled surfaces with a brush or compressed air. Use superheated steam to clean weathered surfaces that are heavily soiled with oil or abraded rubber, etc., prior to treatment.

Only impregnate concrete that has a uniformly dry surface with no damp patches. Should it suddenly start to rain, stop treatment and cover the impregnated areas.

Limitations

Water repellent cream WRP7 should not be applied to wet surfaces or at temperatures below 1°C where pore moisture may be relatively immobile.

Application to bituminous materials must be avoided.

Performance should be assessed in conditions of ongoing saltwater exposure to assess re-treatment times.

Health and Safety

Protective clothing must be worn. Wear gloves and eye protection at all times.

Specification Clause

The following ancillary materials are also available from CPT Ltd;

- DuoGuard™ Hybrid corrosion protection system
- PatchGuard™ and PatchGuard Plus™
- Manganese dioxide reference electrode
- Monitoring equipment

For technical and sales support please contact us at;

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Cert No. 10159

ISO 9001